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**Irregular verbs** p.114  
**Grammar reference** p.115  
**Listening scripts** p.123  
**Glossary** p.131
1 Oil and gas today

Kick off

1 Match the labels with the photos.
   1. pipeline       5. terminal
   2. oil refinery   6. exploration team
   3. oil well       7. petrol pump
   4. tanker

2 Put them in order from the well to the customer. There is more than one possible order.

Listening

A barrel of crude oil

1 An expert describes what happens to a barrel of crude oil. Listen to part A and answer the questions.
   1. What are the different colours of crude oil?
   2. How many metric tonnes of oil travel by tanker each year?
   3. How many barrels of oil go through the Straits of Hormuz each day?
   4. How long is the Druzhba pipeline?
   5. How many barrels does the Druzhba pipeline transport each day?

2 A barrel of oil contains 42 US gallons (159 litres), but it can make 44 gallons of petroleum products! Listen to part B and complete the labels on the diagram.

3 Listen to part C. What uses of petroleum does the speaker talk about? Does anything surprise you?
In this unit
- finding out about oil reserves
- describing routines and activities
- discussing the upstream and downstream sectors
- identifying key jobs in the petroleum industry
- describing responsibilities
- introductions and greetings

Project
1 Find out which regions have the biggest known oil reserves.
2 Find a map of the Druzhba pipeline and see where it goes.

It's my job
1 Hamdan Al Nuami comes from Abu Dhabi. He is a trainee instrument engineer. Complete the interview by matching 1–7 with a–g.
   1 What are you doing at the moment?
   2 Who are your colleagues?
   3 How did you join the company?
   4 What do you do when you're not at work?
   5 So what's the next step?
   6 What do you like best about your job?
   7 Why did you want to work in this field?

2 Read the interview again and answer the questions.
   1 How did Hamdan get his job?
   2 How does Hamdan feel about the opportunity he has?
   3 Does Hamdan want to specialize in one area?
   4 Why does Hamdan believe that local students are special?
   5 How else does the company help Hamdan in his free time?

3 Discuss your answers to the questions in groups or as a class.
   1 Are there similar opportunities in your country?
   2 How international is the oil business where you come from?
   3 How clear is your career plan?

Hamdan Al Nuami

a ____________________________
During the summer vacation, I joined our national oil company's training programme. I'm training to be a fully qualified instrument engineer. It takes two years. I work at the main refinery. Our refinery produces a wide range of petroleum products.

b ____________________________
I am interested in computers and science. The job means I can use the theory in real-life situations.

c ____________________________
Well, right now we are updating the control rooms for the refinery. You know, to make it more modern. It is a really interesting project. Safety is a major part of the instrumentation so you can learn about how the whole refinery works. I don't understand everything yet.

d ____________________________
Well, I work with several other nationalities. We often spend time together after work. But I'm also proud to be part of a growing number of local students and trainees. I believe it is important to increase know-how in the country.

e ____________________________
For me, the best thing is that I can learn about a lot of different things. I know something about instruments but there is also telecommunications, computer technology, and other engineering subjects. I want to learn more about administration, petroleum engineering in general, and the different cultures of the people I work with.

f ____________________________
I like sport - I often play volleyball after work. I usually play twice a week, but this evening we are working late. My family owns a large house where I live with my parents and brothers and sisters, but this week I am staying in the company guest house.

g ____________________________
I want to apply for a place on the company's graduate development programme, which means a placement at an overseas university. If you work hard, there is no limit to what you can achieve.
Language spot

Routines and activities

1 Sentences a–c use the Present Simple. Which sentence describes a general fact?
   a I come from Abu Dhabi.
   b Our refinery produces a wide range of petroleum products.
   c We often spend time together after work.

2 Sentences d–f use the Present Continuous. Which sentence describes
   d I’m training to be an instrument engineer.
   e I usually play twice a week, but this evening we are working late.
   f At the moment, we’re updating the control rooms.

3 Which time phrases do we use with which tense?
   Write PS (Present Simple) or PC (Present Continuous).
   1 always
   2 at the moment
   3 most of the time
   4 right now
   5 sometimes
   6 this week
   7 today
   8 twice a week

4 Some verbs always use the Present Simple, never the Present Continuous. Identify the verbs in these sentences.
   1 I know something about instruments.
   2 I like sport.
   3 My family owns a large house.

Find more examples of verbs that only use the Present Simple in it’s my job.

5 Complete these sentences with the correct form of the verbs in brackets.
   1 Most of the time he ________ (sit) behind a desk, but this week he ________ (get) some practical experience offshore.
   2 A lot of different nationalities ________ (work) in the refinery, so sometimes people ________ (have) problems communicating.
   3 I ________ (not understand) how this instrument ________ (work). Can you explain it to me?
   4 I’m sorry, Mr Peters isn’t here.
   He ________ (have) an Arabic lesson.
   He ________ (always have) one on Monday evening.
   5 He ________ (enjoy) sport a lot. He ________ (go) to the gym twice a week. He ________ (train) for next month’s marathon.

6 Write two sentences that describe your routines and actions that are in progress. Exchange and compare them with a partner.

>> Go to Grammar reference p.115

Reading

The petroleum process

1 Look at the flow chart and decide if 1–8 are upstream, midstream, or downstream. Tick (✓) the boxes.

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<th>Upstream</th>
<th>Midstream</th>
<th>Downstream</th>
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<tr>
<td>2 selling of natural gas to consumers</td>
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<td>3 exploration and discovery</td>
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<td>4 refining crude oil</td>
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<tr>
<td>5 gas gathering</td>
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<td>6 asphalt production</td>
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<tr>
<td>7 recovery of crude oil and natural gas</td>
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<tr>
<td>8 buying petrol / gasoline from a filling station</td>
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</tbody>
</table>
Make nouns from the verbs.
1 explore
2 transport
3 distribute
4 discover
5 recover
6 refine
7 lubricate

Say the words in 2. What do you notice about their stress pattern?

**Example**
explore o exploration oo oo

**From well to user**

**Upstream activity**
Exploration and discovery of oil and natural gas (E&P – exploration and production)
Drilling well
Recovery and production of oil
Gas gathering

**Midstream**
Transportation by pipeline or tanker of oil, gas, or natural gas liquids
Initial processing may happen at well head or FPSO (Floating Production, Storage, and Offloading) vessel

**Downstream**
Arrival at oil terminal and refinery
Refining process
Crude oil turned into different products:
- fuel: gasoline / petrol, diesel, LPG (liquid petroleum gas), butane
- asphalt for road building
- synthetic rubber for tyres
- plastics, e.g. polyurethane, polyethylene

Other products: lubricants, antifreeze, fertilizers
Distribution: products stored or transported to customers

Petrol / gasoline stations
Factories for further treatment

**Vocabulary**

**Key jobs**

1 Match the jobs with the photos.
1 land surveyor
2 maintenance technician
3 petroleum chemist
4 piping designer
5 refinery manager
6 safety officer

Which do you think is the most interesting?

Listen and repeat the names in 1. Follow the intonation patterns.

**Example**
land surveyor

Six people describe their jobs. Listen and say who is speaking.

1
2
3
4
5
6

Suffixes: -er at the end of a noun often shows that we are talking about a job or profession. Identify similar suffixes in 1.
Language spot
Describing responsibilities

1 Study the list of verbs and expressions that the speakers in Vocabulary use to talk about their jobs and responsibilities. Go to the listening script on p.123 and underline them.

Verbs
I look after
I monitor
I oversee

Expressions
I’m in charge of (doing something)
I’m involved in (something / doing something)
I’m responsible for (something / doing something)

2 Work in pairs and imagine that you have one of the jobs from Vocabulary 1. Make short conversations.

EXAMPLE
A Hi, are you new here?
B Yes, I am. My name’s Walid. I’m a piping designer
A Oh really? So what does your job involve / What do you do every day?
B Well, I design piping systems in a refinery. It involves calculating flow rates and pressures. What about you?

3 Think of one more job and describe its activities and responsibilities to the class. Can they say what you do?

EXAMPLE
Well, I’m in charge of taking the oil tanker into the terminal. When I get on the tanker, the captain gives me control of the vessel. I know the waters around the terminal better than anyone else. I am responsible for the safe arrival of vessels in our port.

Answer: tanker pilot

4 Go to Grammar reference p.115

Speaking
Hello, goodbye

1 Mr Gibson, the safety manager, is introducing Hamdan to Dr Al Harbi, the refinery manager. Listen to conversation A and answer the questions.
1 How does Mr Gibson introduce Hamdan?
2 What question does Dr Al Harbi ask?
3 How does Hamdan reply?

2 Listen to conversation B and answer the questions.
1 Who is Farid?
2 What is Farid doing at the moment?

3 Which conversation is more formal and polite?

4 Listen again and write T (true) or F (false).
1 Dr Al Harbi and Mr Gibson are close friends.
2 Dr Al Harbi is more senior than Mr Gibson.
3 Hamdan shows respect to Mr Gibson.
4 Hamdan is Farid’s boss.
5 Hamdan and Farid are the same age / level in the company.

5 Match a more polite expression from A with a less formal expression from B.

A
1 Hello.
2 I’d like to introduce you to ...
3 I’m very pleased to meet you.
4 How are you finding it?
5 I’m very happy to be here.
6 Please excuse me, I have to go.
7 I hope to see you again.
8 May I bother you a moment?
9 Goodbye.

B
a Have you got a minute?
b How’s it going?
c Bye.
d I want you to meet ...
e Nice to meet you.
f See you around.
g Hi.
h I’m having a great time.
i Sorry, I have to go.

6 Are you more confident in formal or informal situations?

7 Work in groups of three. Choose jobs from Vocabulary 1 on p.7. Take turns to introduce each other. Use formal and less formal expressions.
Professional skills
Meeting and greeting

1. How do people in your culture greet each other? Do you
   - shake hands?
   - kiss?
   - hug?

2. Look at the list. Which subjects are good ways of starting a conversation with
   1. someone you meet for the first time?
   2. friends and people you work with?

   family
   sport
   health / health problems
   the weather

   work
   money
   holidays
   the news

3. What advice can you give to
   - a visitor who is coming to your country for the first time?
   - someone new to your school or company?

---

Checklist
Assess your progress in this unit. Tick (✓) the statements which are true.
- I can describe what happens to crude oil
- I can talk about routines and current activities
- I can talk about responsibilities
- I can introduce, meet, and greet new people

---

Key words
Adjectives
downstream
upstream

Nouns
fuel
instrument
oil refinery
pipeline
plant
reserve
rig
sample
terminal

Verbs
flow
oversee
refine
update

Look back through this unit. Find five more words or expressions that you think are useful.
Kick off

1 Look at pictures a–f. They each have something to do with the oil and gas industry. Can you identify what?

2 Match the pictures with 1–6.
   1 About 47% of a barrel of crude oil is used as fuel.
   2 Oil is measured in barrels. A barrel is about 159 litres.
   3 Oil is transported in large ships called supertankers. The biggest carry about 650,000 tonnes.
   4 Oil and natural gas are transported in pipelines.
   5 Scientists believe that the oil we use today was made from very small animals that lived in the sea and died over 300 million years ago.
   6 An accident with an oil tanker can kill many plants and animals.

Listening

The history of oil

1 Before you listen, discuss with your partner possible answers to these questions.
   1 In ancient times, what did people first use oil for?
   2 When did oil first become an important product?
   3 How did people first use oil?
   4 When did oil become an important fuel?
   5 What do we use oil for today?

2 Now listen to Sergei, an oil specialist, and check your answers.

<table>
<thead>
<tr>
<th>Br E</th>
<th>Am E</th>
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<tbody>
<tr>
<td>lorry</td>
<td>truck</td>
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<tr>
<td>transport</td>
<td>transportation</td>
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</tbody>
</table>
In this unit
- important events in the history of oil and gas
- how to pronounce Past Simple verbs
- writing short reports about past events
- using large numbers
- finding out about the oil industry in your region

Language spot

Past Simple

- We use the Past Simple to talk about things that happened at a time in the past.
- **People used oil to light their homes.**
- They didn't want the oil.
- **When did people begin to drill for oil?**

- We often use the Past Simple with time expressions like *four thousand years ago, in 1819, when?*, etc.
- **The Past Simple of *be* is was / were.**
- **There was oil along river banks.**
- The oil wasn't important.

- We form the Past Simple of regular verbs by adding *-ed* or *-ed*.
- **used, employed, decided, erected**

- The Past tense of some verbs is irregular.
- **come — came**
- **find — found**
- **build — built**

- We use *did* to form negative sentences and questions.
- **They didn't want the oil.**
- **When did people begin to drill for oil?**

Around this time, Bissell ________ (see) some pictures of people drilling for salt and he ________ (have) the idea to drill for oil. He ________ (invest) a lot of money in the region and ________ (become) very successful.

3 Make questions about George Bissell using the notes.
1 When / George Bissell / visit Pennsylvania?
2 What / people / use oil for?
3 What / Silliman / say about the oil?
4 Where / Bissell / get the idea to drill for oil?

4 Work in pairs to ask and answer the questions in 3.

Pronunciation

We pronounce the *-ed* ending of verbs in three different ways.

\[
\begin{array}{l|l|l}
\text{/t/} & \text{/d/} & \text{/id/} \\
\hline
\text{collected} & \text{stored} & \text{distilled} \\
\text{invented} & \text{used} & \text{drilled} \\
\text{produced} & \text{burned} & \text{visited} \\
\text{seeped} & \text{wanted} & \text{drained} \\
\end{array}
\]

1 Listen to the verbs and complete the table.

2 Put the verbs in brackets in the Past Simple. Use a dictionary if necessary.

George Bissell ________ (be) a young lawyer in 1853. He ________ (visit) Pennsylvania and ________ (see) how people got oil. They ________ (put) blankets in seep oil and then ________ (drain) the oil into barrels. They ________ (use) the oil as a medicine. He ________ (take) some oil to a chemist called Silliman. Silliman ________ (analyse) the oil and ________ (say) that it could be very useful.

2 Listen again and check your answers. Practise saying the words.

3 Complete the rules.

1 If a verb ends in a /t/ or /d/ sound, the final *-ed* is pronounced ________.

2 If a verb ends in a voiceless consonant sound (/p/, /s/, /k/, /f/, /sh/, /sht/, or /θ/), the final *-ed* is pronounced ________.

3 If a verb ends in a voiced consonant sound (/b/, /g/, /v/, /z/, /n/, /j/, /th/, /m/, /n/, /ng/), the final *-ed* is pronounced ________. 
**Reading**

**The effects of oil**

1 Imagine a small, quiet village in your country. The people in the village have some animals and grow some food. Things don’t change quickly in this village. One day an oil company comes to look for oil. They find oil near the village. How does life change for the village people?

Work in small groups. Discuss how things change. Think about:
- jobs
- new industry
- the environment
- money
- population.

**Example**

**Jobs**

*I think there are lots of new jobs when oil’s found, for example, ...*  
*People stop looking after animals and growing food because* ...

2 Read about how the oil industry developed in Venezuela and answer the questions.

1 When was oil first drilled in Venezuela?
2 Where did the oil companies come from?
3 Why do you think the people of Venezuela were still poor before 1944?
4 What changed in 1944?
5 How important is oil to Venezuela today?

3 Think about the development of the oil industry in your country. What are the things which were similar in your country and Venezuela? What things were different?

**It’s my job**

1 These people are looking for oil. They use a lot of equipment. What do you think they enjoy about their job and what don’t they enjoy?

2 🎧 Listen to Alfred Luki. Why did he choose his job?

3 🎧 Listen again and answer the questions.

1 What is Alfred’s job?
2 What are his working hours?
3 How far does he walk each day?
4 Did he go to college?
5 What training did he do when he started?
6 What does he want to do next?

4 Why does he say his job is hard?

5 Would you like to work as a jug hustler? Why / why not?

---

**The oil industry in Venezuela**

In 1914, the first important oil well was drilled in Venezuela. Large oil companies from other countries, mainly Britain and America, arrived in Venezuela. In 1929, Venezuela was the second largest oil exporter in the world. There were many changes. Before oil was found, people in Venezuela worked in farming. They had animals and grew food. They also worked in factories and made goods. Then people moved into the oil industry. Oil companies from other countries needed workers and people left the land. New towns grew up. Oil production grew very fast and the oil companies grew rich, but the people of Venezuela were still poor. Things changed in 1944 and oil companies had to give half of the money they made from oil to Venezuela. Today the oil industry in Venezuela belongs to Venezuela and it is the fifth largest oil exporting country in the world.
The ESSO name comes from the letters S and O of Standard Oil.

Writing

A short report

1. What do these company names have in common?

2. Study the information about the history of an oil company and use it to complete the short report below.

1870 Rockefeller and others start Standard Oil Company
join with other companies

1926 bring out new fuel Esso

1936 use new technology to make more gasoline

1937 produce first artificial rubber (still used for tyres today)

1942 new technology to produce gasoline

1972 change name to Exxon Corporation

1999 Exxon and Mobil join to form a larger company

2005 ExxonMobil helps expand the offshore North Field in Qatar

Rockefeller and other people started _________ in 1870. Later it joined with other companies and in 1926, it _______ called ___________. It used new technology to _________ in 1936. The following year, researchers ____________ which is still used for making _________ and other products. The company started to use __________ to __________ in 1942. 30 years later, the company ____________ and in 1999, __________ joined to form a larger company. In 2005, ExxonMobil worked with other international oil companies to __________ the giant offshore North Field in Qatar.

Notice how we refer to past time when writing a report.
In 1870
The following year
30 years later
Two years after that

We connect events using and.
30 years later, the company changed its name to Exxon Corporation and in 1999, Exxon and Mobil joined to form a larger company.

3. Look at the notes about the history of Shell. Write a short report using the Past Simple and time phrases.

**SHELL**

1892 Marcus and Sam Samuel decide to transport oil in oil tankers. The first oil tanker sails through the Suez Canal.

1897 Marcus and Sam Samuel name their company the Shell Transport and Trading Company.

1903 Shell Transport and Trading Company join with Royal Dutch Petroleum.

1904 The shell (pcten) becomes the company logo.

1907 Company becomes Royal Dutch Shell Group. They begin production in Russia, Romania, Venezuela, Mexico, and the USA. Prince Borghese wins the Peking to Paris motor rally with Shell motor spirit.

1919 Alcock and Brown use Shell fuel to make the first flight across the Atlantic.

1929 Shell is the biggest oil company in the world.

1939 Company loses buildings and equipment during the war.

1945 Oil found in Africa and South America.

1947 Shell drill offshore oil well in the Gulf of Mexico.

1955 Shell has 300 offshore wells.

1958 Oil production in Nigeria starts.

1960s Shell helps start oil production in Oman.
It also discovers gas in the North Sea.

1970s Shell develops oil fields offshore in the North Sea.
'Formula for success: rise early, work hard, strike oil.'
J Paul Getty, founder of Getty Oil Company

Vocabulary

Numbers

1 Match the words with the numbers.
1 one billion (bn) a 1,000
2 one million (m) b 1,000,000
3 one trillion c 1,000,000,000
4 one thousand d 1,000,000,000,000

- We don't add -s to thousand, million, billion, and trillion to make them plural.
They produce 2.5 million barrels of oil a day.

- We use the plural verb form after numbers but not with an amount of money.
600,000 people work here.
$200,000 is a good price.

Number We say
1,640 one thousand, six hundred and forty
3,440,000 three million, four hundred and forty thousand
2.5 billion two point five billion
5.3 billion five point three billion dollars

2 Read these numbers. Then listen and check.
1 1,650
2 7.4 million
3 187,000
4 $5.7 bn
5 €380,500
6 4,555,200

3 Correct the mistakes in the sentences.
1 A thousand workers now lives in this area.
2 $20 billion are a lot of money.
3 Oil was formed 300 millions years ago.
4 Nine million barrels of oil leaves the refinery each day.

Read each sentence. Listen and check.

Speaking

Checking understanding

When you are listening to others, face-to-face, or on the telephone, you may need to check that you have understood correctly by using phrases like these:
Did you say 140 metres?
2 4 3 9 ...?

We can interrupt someone politely and ask them to repeat what they have said with:
(I'm) sorry. What did you say?

Excuse me. Can / Could you repeat that, please?
Could you repeat the number, please?
We can ask someone to spell a name with:
Can / Could you spell that, please?

1 Work in pairs. Each of you has information about an important oilfield. Student A, go to p.106. Student B, go to p.110.

2 Use the information to label the map.

Project

1 Search the internet to find out about the history of the oil and gas industry in your region. Make notes under these headings.
- date oil / gas first discovered
- location
- oil companies
- quantity of oil / gas
- how life has changed for the people of the region

2 Work in small groups. Share the information you have found and work together to prepare a poster on a white board or flip chart. When you have finished, join another group. Use your poster to tell them about what you have found out. Listen to what they have found out. What information is the same and what is different?
Professional skills
How to manage your time

1 Work in pairs or small groups and discuss these questions.
   - Do you normally finish your work on time?
   - How often do you finish your work late?
   - Would you like to have more free time?

2 Read the advice about how to manage your time. There are two pieces of bad advice. Put a cross (X) beside them. Tick (✓) the advice which is best for you.

   Make a list of the tasks you have to do and the deadlines. [ ]
   Decide which are the most important tasks and put them at the top of your list. [ ]
   Make a timetable and decide when you are going to do your work. [ ]
   Keep your mobile phone switched on and near you. [ ]
   Remember to make time to relax as well as work. [ ]
   Do the tasks you like best first. [ ]
   If you don’t want to work, leave it until tomorrow. [ ]
   Concentrate on the task and don’t let other things distract you. [ ]
   Find a place to work where you can concentrate. [ ]
   Score out a task once you have finished it. [ ]

3 Work in pairs and compare your answers. Can you think of any other good ways to manage your time? Which things should you do better?

<table>
<thead>
<tr>
<th>Br E</th>
<th>Am E</th>
</tr>
</thead>
<tbody>
<tr>
<td>mobile phone</td>
<td>cell phone</td>
</tr>
<tr>
<td>score out</td>
<td>cross off</td>
</tr>
</tbody>
</table>
3 Hydrocarbons

Kick off
1 Match the pictures with the products.

<table>
<thead>
<tr>
<th>Picture</th>
<th>Product</th>
<th>Used for</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>gas</td>
<td>cooking and heating</td>
</tr>
<tr>
<td>2</td>
<td>petrol / gasoline</td>
<td>fuel for cars</td>
</tr>
<tr>
<td>3</td>
<td>naphtha</td>
<td>making other products</td>
</tr>
<tr>
<td>4</td>
<td>kerosene / jet fuel</td>
<td>heating buildings and fuel for aircraft</td>
</tr>
<tr>
<td>5</td>
<td>diesel</td>
<td>fuel for cars, lorries, and trains</td>
</tr>
<tr>
<td>6</td>
<td>lubricating oil</td>
<td>making machine parts move easily</td>
</tr>
<tr>
<td>7</td>
<td>bitumen / asphalt</td>
<td>making roads</td>
</tr>
</tbody>
</table>

Reading
The chemistry of hydrocarbons
1 Work in small groups. Match the word with the correct definition.

<table>
<thead>
<tr>
<th>Word</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>atom</td>
<td>This consists of any number of atoms that are bonded together</td>
</tr>
<tr>
<td>molecule</td>
<td>Different compounds that exist together in the same liquid, for example crude oil</td>
</tr>
<tr>
<td>boiling point</td>
<td>The smallest part of a substance that can exist</td>
</tr>
<tr>
<td>mixture</td>
<td>The temperature when a liquid changes into a gas</td>
</tr>
</tbody>
</table>

2 Look at the diagrams of three hydrocarbon molecules. What shape are they? Match the diagram with the correct word.

straight chain    branching chain    ring

3 Read the text. Write T (true) or F (false).

1 There are three different atoms in hydrocarbons. T
2 Hydrocarbons are useful because they contain a lot of energy. T
3 This is methane. F

4 Natural gas is a mixture of hydrocarbon gases. T
5 Hydrocarbons with five carbon atoms are gases. T
6 Diesel boils at a higher temperature than gasoline. F
7 Naphthas are good fuels. T
8 Bitumen is solid. T

4 Work in pairs. Find the different hydrocarbons mentioned in the text and say what they are used for.

EXAMPLE
Methane – fuel

2 Chemicals made from oil are used to make a number of products. How many products can you name?

EXAMPLE
nylon and other man-made fibres

medicine
Hydrocarbons

Crude oil and natural gas are often found together. They are both made up of hydrocarbons, which are molecules that contain only carbon and hydrogen atoms. Hydrocarbons contain a lot of energy. When we burn them, we get this energy. We use hydrocarbons for fuel for heating, cooking, and transportation. There are also many products that we can make from hydrocarbons. We use chemical processes to change the hydrocarbon chains to make nylon, medicines, and lots of different plastics.

Hydrocarbons have different lengths and structures. Some are straight chains, some are branching chains and some are rings. The smallest hydrocarbons are colourless gases under normal temperature and pressure. These are small molecules with one, two, three, or four carbon atoms. The smallest is methane (CH₄). It has one carbon atom surrounded by four hydrogen atoms. Natural gas is a mixture of small hydrocarbons – methane (CH₄), ethane (C₂H₆), propane (C₃H₈), and butane (C₄H₁₀). They are used as fuels.

Hydrocarbons with more than four carbon atoms in each molecule are liquid. Crude oil is a liquid under normal temperature and pressure. It is a mixture of more than 100 different hydrocarbon molecules. As hydrocarbon molecules get bigger they have a higher boiling point, so it is possible to separate the hydrocarbons. This happens at a refinery.

Gasoline is a mixture of hydrocarbons with between five and eleven carbon atoms. It burns easily and is an important fuel. It is colourless but we add colour for safety. Naphthas are hydrocarbons with between seven and thirteen carbon atoms. They are clear liquids. We do not use them directly as fuels, but we can change their molecular structure at the refinery to make different fuels. They are important for paints and products that dry quickly. Kerosene, diesel, and fuel oils are mixtures of larger molecules with higher boiling points. The largest hydrocarbons in crude oil are solid. They have more than 50 carbon atoms in long chains. Bitumen (Am E = asphalt) is an example. We use bitumen for building roads.

In this unit
- the chemistry of oil and gas
- using countable and uncountable nouns, articles
- using your internet search skills to find out about tectonics
- recording new words
- writing a short report after an oil analysis

Listening
The formation of oil and gas

1 Oil and gas are fossil fuels. What does fossil fuel mean?
2 They are finite resources. What does finite mean and why are oil and gas finite resources?
3 Listen to part of a lesson on the formation of oil and gas and label diagram 1.

Diagram 1

4 Listen again if necessary and label diagram 2 with
   1 source rock
   2 cap rock
   3 reservoir rock
   4 oil and gas.

Diagram 2

5 Match the words / phrases from Listening with the correct meaning.
   1 organic matter a material produced from living things
   2 sedimentary b it's not possible for a liquid or gas to pass through
   3 impermeable c formed from the sand and mud that settle at the bottom of the sea
   4 porous d has spaces that allow liquids and gas to pass through
Oil forms at between 65 °C and 150 °C. Natural gas is formed above 150 °C.

**Speaking**

**Exchanging information**

1 Work in pairs. Student A, go to p.107. Student B, go to p.111.

2 In what ways are sulphur and hydrogen sulphide a problem in crude oil and natural gas? Discuss in pairs.

   *I know that ...*  
   *I'm sure ...*  
   *I think ...*  
   *I don't think that ...*

**Language spot**

**Nouns and articles**

>> Go to Grammar reference p.116

1 Decide if these words are countable or uncountable. Write C or U.

   1 book  
   2 car  
   3 container  
   4 engineer  
   5 environment  
   6 equipment  
   7 gas  
   8 information  
   9 money  
   10 noise

   11 paper  
   12 pipeline  
   13 plant  
   14 question  
   15 rig  
   16 road  
   17 sand  
   18 ship  
   19 water

2 Complete the following with an uncountable noun from 1.

   1 A ton of __________

   2 Three sheets of __________

   3 A litre of __________

3 Complete the sentences with one of the following words. Add a / an or make the word plural if necessary.

   barrel    energy    equipment  
   experience    layer    reservoir

   1 Oil is found in __________ under the ground.

   2 People working on a drilling rig have to move __________ that is very heavy.

   3 __________ of oil is 159 litres.

   4 Oil and gas are very important sources of __________.

   5 Tom is a geologist with twenty years' __________.

   6 Over thousands of years, dead plants and animals were covered in __________ of mud and sand.

4 Complete the sentences with a, an, or the if necessary. Leave the gap empty if nothing is required.

   Oil has formed on __________ Earth in the past and is still forming today. Most oil comes from __________ microscopic plants and animals. Oil from __________ North Sea is found in __________ rocks that were made about 150 million years ago. At that time, the seas and wet areas of land were rich in __________ microscopic organisms. When __________ organism dies, it sinks to the bottom of __________ sea. It forms __________ layer of organic material. This gets covered in __________ layers of sand and mud. __________ air can't reach __________ organic matter.
Sedimentary rocks are composed of three parts—grains (natural minerals), natural cement (bonds the grains together) and pores (spaces filled with water, oil, gas). The pore space gives the rock porosity and determines the total volume of the field. The natural cement determines the rock permeability and the production rate from the field.

**Professional skills**

**Making a presentation**

1. Look at the list of points to think about when you are preparing to give a presentation to other people. Work in pairs and decide which ones you think are true and which ones are false. Write T (true) or F (false).
   1. Everyone will understand the words you use.
   2. It’s important to find out what they know before you start.
   3. Remember to use simple language.
   4. It’s not necessary to organize your points.
   5. Give details after you explain the background.
   6. Speak quickly to save time.
   7. Use pictures or diagrams.
   8. Put lots of information on the diagrams.
   9. Ask people if they understand.
   10. Don’t write down everything you want to say beforehand.

2. Work in small groups.
   1. Think about a presentation you have heard. What was good and what was not very good? How could the speaker do better?
   2. What do you think is the most difficult thing when you have to make a presentation?

**Vocabulary**

**Recording new words**

1. When you write down new words, remember to note down if it is a noun, verb, adjective, or adverb. It’s a good idea to note down one or two words which are often used together with your new word.

   **EXAMPLE**

   *atom* (noun): carbon atom, an atom of hydrogen
   *organic* (adjective): organic matter, organic chemistry

2. Another way to help remember a new word is to write it in a sentence. That helps you remember the meaning and also how to use the word.

   **EXAMPLE**

   *sedimentary* (adjective) layers of sand, mud, and organic matter form sedimentary rocks
   *exist* (verb) molecules with more than four carbon atoms exist as a liquid

   Find five new words from this unit. Use a good English–English dictionary, such as the *Oxford Wordpower Dictionary*, and find out if the word is a noun, verb, adjective, or adverb. Write each new word in a sentence.
It's my job

1 Anna Wong works as a petroleum chemist. What training do you think a petroleum chemist needs? Discuss in pairs and tick (✓) the boxes.

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>University degree in chemistry</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Offshore safety training</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Computer technology training</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Training in statistics</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time management courses</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Team working courses</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2 Read the text and check your answers.

3 Answer the questions
1 Why did Anna want to work in the oil industry?
2 Why did she find it easy to get a job?
3 What sort of tasks did she have to do at first?
4 Why does she have to do an offshore safety training course?
5 Why do you think her company asked her to do courses in time management and teamwork?
6 Why are there more jobs for petroleum chemists at the moment?

4 Would you like to do this job? Why / why not? Would you like to work abroad? Why / why not?

Anna Wong

I have always liked chemistry and after I graduated from university, I decided to find a job in the oil industry because it's more practical. My thesis at university was about catalysts used in the petroleum industry and this gave me an advantage when I went for an interview.

I have been with this company for three years and I've gained a lot of experience using different modern measurement techniques.

To begin with I had to do routine laboratory work, but gradually I got more interesting projects. I helped install and calibrate specialist equipment at a refinery and recently I've been part of an offshore project. Next week I have to do a three-day offshore safety training course so I can go to the offshore platform to help with commissioning.

I have to make sure I know about new developments and learn more about statistics and computer technology. In the past I just reported results but now I also have to draw conclusions and make recommendations. I've been on company training courses for time management, communication, presentation skills, and teamwork, which have been very useful.

The level of exploration in the industry changes from time to time so there is sometimes a higher demand for petroleum chemists. In the last few years the environment has become very important so there are more jobs for chemists. I need to get more experience and then I'm going to apply for a job abroad.

Writing

Analysis report

Barry Saunders has carried out an analysis of oil samples and has written a short report.

1 Read the memo and answer the questions.
1 What has he found in the oil that he didn't expect?
2 What does he want to happen next? Why?

2 Put these headings in the correct part of the report.
Recommendations  Attachment  Results
Objective     Subject

3 In an oil analysis, you have found that the oil contains high levels of sulphur. Write a short analysis report.

USEFUL LANGUAGE
Please find attached ...
The results show ...
We recommend ...
I have arranged a meeting with ... to ...
We need to ...
Memo

To: Distribution (Restricted)  Date: 16 November 20—
From: Barry Saunders
Dept: Petroleum Engineering

1: Analysis Report – Well head Samples, Excelsior Project.

Please find attached the analysis on the oil samples sent to Petrolink Laboratories.

2: Initial analysis to provide information for conceptual design team.

Summary: The results show that the level of mercury is higher than expected. We recommend that further tests are carried out using the sampling techniques that Petrolink suggested.

I have arranged a meeting with the project design team to discuss equipment design, material selection, and waste disposal issues.

Background: High levels of mercury can cause damage to piping and equipment if materials are not chosen correctly. It can also be hazardous to health and the environment.

3: The results show expected levels of CO₂ and sulphur but the Hg content is higher than expected at 300 ppb.

Conclusions: In order to confirm the results of this initial analysis, we need to run further tests to eliminate contamination or measurement errors, to provide additional gas and condensate samples, and to determine the species of mercury present.

4: We recommend further discussions with Petrolink to decide on the procedure for sampling and further testing, costs, etc. We also recommend a meeting with the conceptual design team to discuss which materials and equipment to use, waste disposal and methods of removing mercury. Action BS.

5: Petrolink Analysis Data

Checklist
Assess your progress in this unit. Tick (✓) the statements which are true.

- I can understand a text about the chemistry of oil and gas
- I can use countable and uncountable nouns and articles
- I can record new words
- I can write a short report

Key words
Adjectives
chemical
porous
sedimentary

Nouns
analysis
atom
molecule
permeability
pore
porosity

Two-part nouns
cap rock
finite resources
fossil fuel
reservoir rock
source rock

Verb
bond

Look back through this unit. Find five more words or expressions that you think are useful.
4 Exploration

Kick off

1 Look at the photos. What are the people trying to find?
2 Which ones are the most successful?
2 Read the text and find out where it refers to these different methods.
3 Answer the questions.
1 What are the three main methods used in oil and gas exploration?
2 Why are aerial and satellite photographs useful?
3 What is a well log, and why is it important to keep one?
4 What sort of samples do chemists take? How can this help in the search?
5 What is the difference between a magnetometer and a gravimeter?
6 How do scientists carry out seismic exploration? Which methods are used on land?
4 Match the stages a–f below with headings 1–6 in the text.
   a create well logs and take core samples for analysis
   b drill exploratory wells
   c geologists take samples on ground
   d identify petroleum traps
   e use ‘geological reasoning’ to map area
   f aerial photographs identify possible areas

Reading

Research methods

1 Oil companies use many different methods in their search for oil and gas reserves. Match the methods with the photos.
1 aerial survey   2 chemical analysis   3 magnetic survey   4 seismic survey
In this unit
- reading about oil and gas research methods
- the Passive
- listening about trends in oil consumption
- exchanging opinions
- report writing

**GEOLOGICAL METHODS**

1. Photographs are taken from planes or satellites. These are then examined by geologists. They look for the special rock formations where oil is often found. These can be seen from the air. Afterwards, geologists on the ground collect rock samples and analyse them.

2. When a possible future oil field is identified, the next step is to drill an exploratory well. These are sometimes called 'wildcat wells'.

3. Each time a new well is drilled, a 'well log' is created. The 'well log' is a record of the rocks and the depths at which they are found. Geologists also keep core samples for analysis. Geologists can use the information from different well logs to construct a map of the area between the wells. This process is called 'geological reasoning'.

4. This can help to identify where there are perhaps 'petroleum traps' for future drilling.

**GEOCHEMICAL METHODS**

5. Geochemists analyse samples of surface water and soil for small amounts of oil and gas that show oil or gas reserves. A gas chromatograph can analyse gas. At sea, hydrocarbons can be found by equipment that is pulled along in the water.

**GEOPHYSICAL METHODS**

6. Geophysicists use mathematics and physics to create a picture of the sub-surface. They can identify types of rock by their density (mass) and magnetic qualities. They use different equipment in their search. A gravimeter shows rock density, and a magnetometer measures magnetic fields. A magnetometer can be used in planes while flying over an area. Another method is seismic exploration, which uses sound. Shock waves are produced by explosives that are placed in a hole in the ground. These waves are reflected back and show the different kinds of rock under the surface. Instead of explosives, a vibrator truck will be used.

**Language spot**

**The Passive**

1. Look at 1–4. Tick (✓) the sentences where we know who does the action.
   1. Each time a new well is drilled, a 'well log' is created.
   2. Geologists also keep core samples for analysis.
   3. Photographs are taken from planes or satellites.
   4. Geochemists analyse samples of surface water and soil for small amounts of oil and gas.

2. Study the rule about the active and the passive. Decide which sentences in 1 use the Passive. When we know and are interested in who does something, we use the active.

**Example**

*Geologists keep core samples for analysis.*

If we don’t know / don’t care who does something, we use the passive.

**Example**

*Photographs are taken from planes or satellites.*

3. Study the sentences. How do we form the Passive with can and will?

   *Rock formations can be seen from the air.*
   *A vibrator truck will be used.*

4. Transform these sentences from active to passive. Begin with the words in bold.

   1. Geologists conduct an aerial survey from a plane or satellite.
   2. They study the photographs for examples of reservoir rock formations.
   3. Afterwards, geologists on the ground collect rock samples and analyse them.
   4. Geochemists will explore the rainforests for oil soon.
   5. A magnetometer measures magnetic fields and an instrument called a gas chromatograph can analyse gas.

**Go to Grammar reference p.117**
Pronunciation

1 Listen and say these words that describe different professions in oil exploration. How many syllables does each word have? Which one is stressed?
- geologist
- geophysicist

2 Now practise the word petroleum.

3 Listen and repeat.
- petroleum geologist
- petroleum geophysicist

4 Say the sentences.
   1 Barry's a petroleum geologist.
   2 The company wants to recruit a petroleum geochimist.
   3 Petroleum geophysicists have an interesting job.

It's my job

1 Hugo Lopez trained as a geophysicist and now works as a geology lab technician in an energy company. Read the interview and answer the questions.
   1 How much time does he spend in the field?
   2 What does he do in front of his computer?
   3 What is in the 'core store'?
   4 What equipment does he use?
   5 List the three special skills he mentions.
   6 Who does he work with?

2 What do you think are the advantages and disadvantages of his job? Would you like to do it?

3 Match the phrasal verbs in italics in the text with the definitions.
   **Example**
   try to find – look for
   1 find while doing something else
   2 discover a fact / information
   3 find information from data and records
   4 try to find something special / pay special attention
   5 investigate

4 Complete the sentences with one of the phrasal verbs from 3.
   1 Can you send them an email to _________ the price of a new microscope?
   2 If you can't remember his number, _________ it _________ in the staff register.
   3 I was analysing some samples when I _________ some traces of rare fossils.
   4 Always _________ traces of this rock, it usually signals the presence of hydrocarbons.
   5 I can't find the well log for well 7, can you help me _________ it?
   6 The safety engineer is _________ the reasons for the explosion.

Hugo Lopez

I work as a geology lab technician in an energy company. We look for the best places to drill wells.

Do you spend much time in the field?
No, mostly I'm in front of my computer creating models. Or else I'm in the core store. This is where we keep the samples we come across during the drilling.

What equipment do you use and why?
I use a microscope to examine samples. I look out for traces of hydrocarbons or fossils that give me the age of the rock and so on. I also operate underwater cameras and the machinery that collects rock samples. I can do all of this from my workstation.

What special skills do you need?
Firstly, you need to know the characteristics of the rocks you come across. Then you need to be good at seeing things in three dimensions. Finally, you need to know what all the data means. A group of three or four people usually looks into the subject.

Is it a nine to five job?
 Mostly, but when you're on an operation, you have to be available any time of the day or night. The guys doing the drilling may need to find something out before they make an important decision. They may want me to look up some important data for them.

How important is teamwork in your job?
Very. Different team members have different skills. I work alongside a seismic interpreter and a reservoir engineer.
Listening

Trends in oil consumption

1 Study the unusual map that looks at world oil consumption. How does it work? Which countries and areas are the biggest/smallest consumers?

2 Dr Marion Bell is an expert on the world consumption of oil. Listen to an extract of a radio interview where she was asked about trends in oil consumption. Listen to Part A, and complete the notes.

Part A
Between 1994 and __________*, consumption rose by __________* a year.
In 2003–2004 it went up by __________*.
Chinese consumption __________* between 1996 and 2006. By 2030, world demand will be __________* million barrels a day.

3 Listen to part B and answer the questions.
1 Put the four main uses of oil in order of importance.
   domestic (e.g. heating) _______
   industry _______
   transportation _______
   commerce _______
2 What percentage of oil consumption is used for transportation
   a globally? _______
   b in the US? _______
3 How is oil consumption in China and India different from other countries?
4 How does Dr Bell think this can change?

4 Look at the verbs. Which mean ↑ and which mean ↓?
   decrease _______
   fall _______
   go up _______
   halve _______
   increase _______
   rise _______

5 Make pairs of opposites.

Project

1 Work in groups and find out
   1 the change in the price per barrel of crude oil since 1970
   2 the developments between these dates.

2 Oil companies are always looking for new sources of crude oil. Find out about
   1 the Athabasca Oil Sands in Alberta, Canada
   2 offshore oil reserves in Greenland.
What challenges do each of the locations present?
bitumen (n) (Am E = asphalt) a heavy, sticky oil often used for coating roads

**Speaking**

**Athabasca Oil Sands**

1 Read the notes about the Athabasca Oil Sands in Canada. Do you think it is a good idea to exploit them?

1 World's biggest source of bitumen. Equal to the world's oil resources.
2 Exploration costs are low. You can see the oil!
3 Refining costs are high.
4 Steam oil extraction uses a lot of water → risk of pollution.
5 It is worth exploiting the Sands when world oil prices are high.
6 The Oil Sands are under forest in a wild and beautiful area.
7 Exploitation will destroy the forest and affect the lives of Native Canadians.

2 Steve, Rafiq, and Amin are discussing the notes. Listen and write S for Steve, R for Rafiq, and A for Amin.

S thinks that Canada should exploit the Oil Sands. R thinks that it is a big financial risk. A thinks that the environment is more important than oil. A thinks that today's oil companies respect the environment. S thinks that the Canadians shouldn't exploit the oil.

3 Listen again and tick (✓) the words and expressions that they use.

Giving your opinion
I think / I believe ...    In my opinion ...
From my point of view ...

Saying what you think is right
They should ...        They shouldn't ...

Giving someone else's opinion
According to (someone else)       Experts say ...
Some people say ...

Agreeing / disagreeing
I agree.                I don't agree / I disagree.
I think so too.         I don't think so.
Yes, but ...

Accepting someone's opinion
Yes, I see what you mean.
I hear what you're saying.

Asking for someone else's opinion
What do you think?
What's your view / opinion on this?

4 Study the situation. List the advantages and disadvantages of exploiting oil fields in offshore Greenland.

Experts believe there are huge oil reserves offshore from Greenland. Exploration will be difficult and expensive. It is only possible to explore three months of the year. Temperatures are −30°C in winter. Drilling offshore will be difficult. There are dangers from icebergs. There is also a 25% chance that there is no oil. Greenland's 57,000 people live mostly from fishing and hunting. Oil will allow it to become rich and completely independent of Denmark. Drilling and onshore installations could damage Greenland's environment. The habitat of wildlife like polar bears is in danger. Some people believe it will destroy the traditional way of life of Greenlanders and make social problems.

5 Work in groups of three and discuss what they should do.

**Writing**

**Short report and linking words**

1 Dave Bradley is a manager at an oil company that is thinking about exploiting the Oil Sands. Read his report. Is Dave for or against it?

2 Match the headings with the paragraphs.

a Environmental risk     d Background
b Financial risk         e The business opportunity
c Recommendations
Subject: Athabasca Oil Sands Project
1 ___________
The Athabasca Oil Sands in Canada have the world's biggest source of bitumen. A working party was asked to look into exploiting the resource.
2 ___________
The Oil Sands provide an enormous and accessible reserve of oil. When world oil prices are high, companies like ours may consider exploiting the Sands.
3 ___________
Although exploration costs are low, production costs are high. The steam extraction process is expensive because it uses a lot of energy.
4 ___________
The Sands are covered by forest in an area of natural beauty. Steam extraction needs a lot of water so rivers will probably be polluted and wildlife killed. In addition, it will affect the lives of the native people who live there.
5 ___________
On balance, I believe that the financial risk and risks to the company's reputation are too great. In my opinion we should continue to exploit our more conventional resources.

3 Read the report again. Which of the words in bold
1 introduces a result?
2 adds an important idea?
3 introduces a reason?
4 is like 'but'?  
5 introduces his final opinion?

4 Rephrase the sentences using the words in brackets.
1 There are oil reserves in offshore Greenland. Exploration will be difficult. (although)
2 Drilling offshore will be difficult. Temperatures are −30 °C in winter. (so)
3 There is a risk from icebergs. It is dangerous. (because)
4 There is a chance there is no oil. (in addition)
5 Oil will help Greenlanders live more successful lives. (in my opinion)

5 Use the headings from 2 to create a report about exploiting Greenland's offshore reserves.
5 Drilling

Kick off
1 Successful drilling depends on controlling the pressure in the well. What do oil workers mean when they talk about a 'blow-out'? What kind of damage can it cause?

2 How can oil workers reduce the risk of a blow-out?

Vocabulary
The drilling rig and drill string
1 Study the diagram of a drilling rig and match the descriptions to the words in the diagram.

Example
This raises and lowers drilling equipment in and out of the well. hoisting line

1 The swivel and the drilling equipment are all suspended from this. 

2 The hoisting line goes around this piece of equipment. When it turns, the line goes up or down. 

3 This is the steel tower that goes over the well. All the lifting and drilling equipment is inside it.

4 This connects two objects. It allows the one below to rotate, and the one above to stay still.

5 This is the small platform near the top of the derrick where the one of the drilling team stands.

6 This is the frame and wheels that move up and down the derrick on the hoisting line.

7 This is the steel frame and wheels that are fixed on top of the derrick.
2 Read the text about what happens from the drilling platform to below ground. Label the diagram with the words in the list.

bit  drill collar  drill pipe  kelly

The drill string

The work of drilling under the ground is performed by the drill string. The drill string consists of the kelly, sections of drill pipe, the drill collar, and a bit to drill the rock. The kelly is a strong pipe that is always at the top of the drill string. It has four or six sides and goes through the rotary table which turns around (rotates). The rotary table is on the drill floor. There are many lengths of drill pipe between the kelly and the drill collar. Oil workers add sections of drill pipe one by one to the kelly. Each time they add a section, they lift the kelly out of the hole. Then they add a section of drill pipe at the top of the string and lower it back into the ground. At the bottom of the string we can find the drill collar. The bit goes into the collar.

Bits are usually tricone – in other words, they have three rotating cones. A circular bit with a hole in the middle is used to take core samples. Drill bits can be covered with industrial cones to make them last longer. Drilling mud is pumped through jets in the bit – this lubricates and cools it and, as the mud is circulated, it also carries the pieces of drilled rock fragments to the surface.

Language spot

Prepositions

1 Complete the sentences.

1 The crown block is _________ the top of the derrick.
2 The drill collar is _________ the bit and the drill pipe sections.
3 A member of the crew stands _________ the monkey board.
4 The kelly goes _________ the rotary table.
5 The hoisting line goes _________ the drawworks.
6 The swivel is _________ the hook.

2 Make more sentences of your own.

3 Work in pairs. Student A, go to p.109. Student B, go to p.111. Take turns to describe your picture while your partner draws it.

Go to Grammar reference p.118
Listening
Drilling crews

1 Match the jobs with the descriptions. The ...
   1 company man       a is in charge of the engines.
   2 drill pusher      b is a general helper.
   3 derrickman        c looks after the mud supply.
   4 mud man           d leads the drilling team.
   5 motor man         e is second in command.
   6 roustabout        f represents the oil company.
   7 roughneck         g handles the pipes.

2 Simon is talking to Jack O'Riordan, an oil man with
   over thirty years' experience of drilling wells. Listen
   and check your answers to 1.

3 Complete the organizational chart with the jobs in 1.

   Drilling crew

   ___________ 1
   ___________ 2
   ___________ 3 4 5 6

4 Listen again and answer the questions.
   1 What is the difference between the company man
      and the drill pusher?
   2 Why does the derrickman stand on the monkey
      board?
   3 What do they call it when they take part of the drill
      string out of the ground and put it back again?
   4 What are three different things mud does?

5 Which job do you think is the most
   • tiring?   • complicated?
   • stressful? • dangerous?

6 Which one would you like to do?

Reading
Drilling methods

1 How many different methods of drilling do you know?

EX: How many feet a day did people manage to drill in the
   early days of oil? 20–30 feet
   1 How many feet of rock can a modern rotary drill
      bore in a day?
   2 How many deviated wells run from the Cognac
      platform?
   3 How much greater is oil production from a
      horizontal well?

3 Label the diagrams with the type of drilling they show.

   a

   b

   c

   d
The best way to drill

In the early days, oil men didn’t exactly drill, they broke the rock with a kind of chisel and lifted out the pieces in a basket. Progress was slow — sometimes drilling teams only drilled 20 to 30 feet a day. These days modern rotary drills can bore through several hundred feet of rock in the same time. Engineers pump mud down the borehole to lubricate the bit. This stops the bit from becoming too hot, and also brings the drilled rock to the surface. This rock is analysed and the data is used to create a well log.

Boreholes can be vertical, in other words, they go straight down. If a bit meets hard rock, the well may deviate; that is, it accidentally changes direction. However, with modern technology drillers choose deviated boreholes from the very beginning. In fact, this kind of drilling is more common than simply vertical wells. Most oil-bearing strata are approximately horizontal so deviated drilling allows drillers to enter horizontally across oil-bearing rocks. Once the drill bit has entered the horizontal oil-bearing rock (the reservoir), it sends continuous feedback data for the well log. The engineers read the log and then they adjust the angle of the borehole according to the information they receive. In this way the well stays within the reservoir. This is especially useful when the sub-surface is fractured. Horizontal drilling is much more efficient than the older, vertical wells. It is possible in some circumstances to drill into an underwater oil reservoir from a land-based derrick. It can also be useful where the oil is under, say, a large mountain.

Deep water offshore platforms use multiple deviated wells from a single well. The Cognac platform in the Gulf of Mexico has sixty-two deviated wells running from it! This way a single well can be used to exploit a large area.

A horizontal well runs through the area above and across the reservoir. A horizontal well can recover five or six times more oil than a straight-down well. It also means that fewer vertical wells are dug and less damage is done to the surface.

mud (n) a mixture of earth and water. Drilling mud is a special mixture of different substances that may include oil, water, and chemicals.

reservoir (n) hydrocarbons trapped in porous or permeable rock

well (n) a deep hole in the ground to supply oil or water

Speaking
Options and suggestions

1 Ali, Saleh, and Mark are having a meeting about a possible drilling site. Listen and write A (Ali), S (Saleh), or M (Mark).

1 _____ is in charge of the meeting.
2 _____ suggests deviated drilling.
3 _____ thinks an offshore rig can exploit a bigger area.
4 _____ thinks that offshore drilling is expensive.
5 _____ suggest a semi-submersible rig.
6 _____ agrees to compare drilling costs.

2 Study the useful language. What form of the verb follows each of the introductory expressions?

Presenting choices and making suggestions

We could drill from onshore.
How / what about comparing the costs?
Why don’t we compare the costs?
Let’s have another meeting.
Shall we say Thursday?

Giving orders

Can you arrange that for next week, Saleh?
Will you compare the costs of the different methods?

Promising action

Yes, certainly. Yes, of course.
I’ll contact them after the meeting.

3 Work in groups of three and hold a short meeting. Student A, you are in charge of the meeting. Go to p.107. Student B, go to p.109. Student C, go to p.113.

Pronunciation

The intonation of how we make a suggestion or give an order is as important as what we say.

Listen and repeat the sentences.

1 We could drill from onshore.
2 How about comparing the costs?
3 Why don’t we compare the costs?
4 Shall we say Thursday?
5 Can you arrange that for next week, Saleh?
log (n) a written report that documents the progress of an activity. A 'logger' is the person who creates the report. A 'wireline logger' is in charge of this process.

wireline (n) a strong metal cable that is used to lower and raise important recording equipment in the borehole.

It's my job

1. What is a well log? When is it made?
2. Read the text quickly and tick (✓) the right box.
   A well log
   A wireline log
   ☐ 1. uses a sonde
   ☐ 2. records the details of samples taken from drilling mud
   ☐ 3. is created after the borehole is made
   ☐ 4. lists fossils
   ☐ 5. records measurements for resistivity and radioactivity
   ☐ 6. is based on the first drilling
3. Read the text again and answer the questions.
   1. What is a well completion?
   2. Which is more expensive, drilling the well or completing the well?
   3. What is the basic reason for creating a wireline log?
   4. Do you think this job sounds interesting? Would you like to do it?

Writing

Placing an order

1. Mustafa is talking to Patrick about what he needs to drill a well. Read their conversation and compare it with Mustafa's order. What other things did Patrick remember he needed?

   M Have you completed your requisition form, Patrick?
   P Yes, we'll need a new kelly.
   M Four or six sides?
   P Six. And sixty lengths of drill pipe.
   M 20 or 30 feet long?
   P Thirty feet.
   M OK. And what about drill bits?
   P Well, we need two tungsten and one diamond tricone.
   M Great. I'll order everything tomorrow. If you think of anything else, tell me before then.

Ahmed Issa

Ahmed Issa is a wireline logger. He has worked in the Gulf and in the North Sea.

What's a well log and what kind of information does it record?

Basically we create a well log when we first drill a hole. It is a record of some basic information about the hole. A well log lists the rocks we meet and their depth. We colour-code them. We make a note of fossil content too.

So what's a wireline log?

A wireline log comes after the hole is made. It's a second investigation of the borehole to check that it is really worth completing. 'Completing a hole' means that you get it ready for production. When a well is completed, the hole has a casing that is made of steel and concrete. Completing a well is far more expensive than drilling it.

And this is where the wireline logger comes in?

Exactly. We perform extra tests. We put a metal cable – the wireline – down the hole with a sonde attached to it. This is a metal cylinder that contains measuring equipment. It measures the porosity of the rocks, its radioactive properties, and its electrical resistance. The oil company wants to be as sure as it can be that it will be productive.

So the information you have is much more complete than that from the first well log?

Exactly. The results from the wireline log are carefully analysed. And if they are positive, the company will complete the well.
Job number: GH345/723  
Wadi Oil Company

Please could you supply the following:

- two six-sided kelly pipes
- three hardened steel drill collars
- 60 x 30 foot lengths of drill pipe
- 20 x 20 foot lengths of drill pipe
- two tungsten-coated tricone drill bits
- one seven-inch diamond tricone drill bit
- one circular core extractor bit

To be delivered to the GH345 site.

Please advise of any delay.

Mustafa Said

2 Study the example. How much information comes before the final noun?

**EXAMPLE**

- It is seven inches wide.
- It is covered in diamonds.
- It has three cones.
- It is used to drill.
- It is a bit.

**= A seven-inch diamond-covered tricone drill bit**

shape / size material features purpose noun

3 How are these described in Mustafa’s order?

1. a kelly pipe with six sides
2. a drill collar made of hardened steel
3. a length of pipe that is 30 feet long and used for drilling
4. a bit made of three cones that is coated in tungsten and used for drilling
5. a circular bit that is used to extract cores

4 Someone who isn’t an expert is talking about what they need. How would a real expert say the same thing?

We are drilling through some hard rock. So we’ll need a couple of drill bits – the ones that are coated with diamonds. I am also going to need a circular bit for taking samples. Also, we need 60 lengths of pipe – 40 that are 30 feet long and 20 that are 20 feet long. Another thing I’ll need is a kelly – one with four sides to go with our rotary table. That’s all for the moment.
6 Environmental protection

Kick off

1 Put the letters in the correct order to make the two words missing in the definition.

_______ RIA ________ ATWRE ________ land

The environment is the natural world, for example the land, ________, and ________ in which people, animals, and plants live.

2 Environmental pollution occurs when we make the environment dirty and harm or kill the plants and animals that live there. How does the oil and gas industry cause pollution and affect the environment? Make a list. Look at the photos for some ideas.

3 Can you think of examples of pollution in your area? What causes the pollution? How could people stop or reduce this pollution?
Reading

Oil pollution

1 Look at the pie chart. What is the biggest source of oil pollution? What do you think the other two sectors are?

2 Read the text and label the last two segments in the pie chart.

What causes oil pollution?

1 Oil causes pollution of rivers, lakes, and oceans. But where does this oil come from? Scientists believe that waste oil is responsible for the most pollution. Some of this comes from industry, some from our roads, and some is thrown away by people.

2 Oil leaks and spills happen because of technical problems, mistakes, vandalism (damage caused by people for no reason), accidents, or war. The smallest amount of oil comes from offshore drilling activities where oil is sometimes spilled because of burst (broken) pipes or human error (mistakes made by people). Major oil tanker disasters account for slightly more oil pollution. Accidents with ships are the result of ships hitting each other or hitting sand or rocks below the water. Accidents happen because of human error, poor maintenance, or poor communication between the crew members working on the ship. They can also happen when bad weather forces an oil tanker against a rocky coast.

3 A major oil leak or spill can result in very serious damage to plants and animals, the environment, and the local economy. Some parts of the environment are more easily damaged than others. For example, in water near the coast there are thousands of plants and animals that could die.

4 Governments and oil companies around the world are working together to reduce oil pollution. Improved safety training and management means fewer spills. Satellite and aircraft are used to quickly identify new cases of pollution. New technical measures include double-hulled tankers, ships with one body inside another.

3 Choose the best paragraph heading for paragraphs 1–4.
   1 a The main source of oil pollution
      b Waste oil from industry
   2 a Tanker disasters
      b The reasons for oil spills
   3 a Damage to the environment
      b The effects of oil spills
   4 a Preventing oil pollution
      b Working together

Pronunciation

1 Listen to these nouns from the reading text. How many syllables (sounds) do they have?

   EXAMPLE
   industry 3  
   pipes 1
   waste  
   aircraft  
   result  
   disaster  
   economy  
   error  
   problem  
   sand  
   accident  
   rocks  
   environment  
   drilling  
   tanker  
   damage  
   effects  
   pollution

   Listen again and repeat the words.

2 Look at the two-syllable nouns above. Which are stressed ●● and which ●●?

   EXAMPLE
   ●● tanker

   ● Listen and check. What is the usual stress pattern for two-syllable nouns?

3 Where is the stress in these two-syllable nouns?

   sector  
   river  
   members  
   ocean  
   mistake  
   amount  
   members  
   training  
   measures

   ● Listen and check.
The amount of petroleum products ending up in the ocean is estimated at 0.25% of world oil production: about 6 million tonnes per year. How does this happen? How can this figure be reduced?

**Language spot**

**Cause and result**

**Grammar reference p.118**

1. Look at these sentences from Reading. Decide which part of the sentence talks about the cause and which part gives the result.

**Example**

*Oil causes pollution of rivers, lakes, and oceans.*

<table>
<thead>
<tr>
<th>cause</th>
<th>result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waste oil</td>
<td>is responsible for the most pollution.</td>
</tr>
<tr>
<td>Oil</td>
<td>is sometimes spilled because of burst pipes.</td>
</tr>
<tr>
<td>Major oil tanker disasters</td>
<td>account for slightly more oil pollution.</td>
</tr>
<tr>
<td>Accidents</td>
<td>with ships are the result of ships hitting each other or hitting sand or rocks below the water.</td>
</tr>
<tr>
<td>Accidents</td>
<td>with ships happen because of human error.</td>
</tr>
<tr>
<td>A major oil spill</td>
<td>can result in very serious damage.</td>
</tr>
</tbody>
</table>

2. Put the verbs in brackets in the correct form.

<table>
<thead>
<tr>
<th>sentence</th>
<th>verb</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oil that seeps naturally from the bottom of the ocean ________ (account) for some water pollution.</td>
<td>account</td>
</tr>
<tr>
<td>In 1989, a major tanker disaster ________ (cause) serious damage to the environment.</td>
<td>cause</td>
</tr>
<tr>
<td>Major oil spills ________ (result) in long-term damage to the environment.</td>
<td>result</td>
</tr>
<tr>
<td>An increase in the demand for oil in the 1960s ________ (result) in larger oil tankers.</td>
<td>result</td>
</tr>
<tr>
<td>Less oil pollution ________ (be) the result of governments working together.</td>
<td>be</td>
</tr>
</tbody>
</table>

3. Use the notes below to write sentences to explain cause and result relationships.

<table>
<thead>
<tr>
<th>relationships</th>
<th>cause</th>
<th>result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oil in sea water / the death of marine plants and animals</td>
<td>oil outbreaks</td>
<td>marine life death</td>
</tr>
<tr>
<td>Birds can't fly or feed / oil on their feathers</td>
<td>pollution</td>
<td>bird behavior change</td>
</tr>
<tr>
<td>Pollution of the coast / a reduction in tourists</td>
<td>tourism</td>
<td>coastal pollution</td>
</tr>
<tr>
<td>Contaminated drinking water / leeking oil pipes</td>
<td>drinking water</td>
<td>oil leak</td>
</tr>
<tr>
<td>The use of satellite technology / the quick detection of oil spills</td>
<td>technology</td>
<td>satellite technology</td>
</tr>
<tr>
<td>Some pollution / human error</td>
<td>error</td>
<td>pollution</td>
</tr>
</tbody>
</table>

**Listening**

**Protecting our environment**

1. Work in pairs. You are going to listen to a reporter talking to a scientist about how the oil industry affects the environment. Look at the questions she asks and some of the words the scientist uses. Check you know what the words mean. What do you think the scientist's answers will be? Make notes.

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>When does oil cause pollution?</td>
<td></td>
</tr>
<tr>
<td>Is there a way we can reduce this pollution?</td>
<td></td>
</tr>
<tr>
<td>Does transportation cause the most pollution?</td>
<td></td>
</tr>
<tr>
<td>How does oil cause air pollution?</td>
<td></td>
</tr>
<tr>
<td>How can the oil industry reduce air pollution?</td>
<td></td>
</tr>
<tr>
<td>Does oil cause any other kinds of pollution?</td>
<td></td>
</tr>
</tbody>
</table>

2. Listen and see if your ideas are the same as the scientist's.

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>What is global warming?</td>
<td></td>
</tr>
<tr>
<td>How do car makers help reduce pollution?</td>
<td></td>
</tr>
<tr>
<td>How does the oil industry cause light pollution?</td>
<td></td>
</tr>
</tbody>
</table>

**Project**

In April 2010, the worst oil spill in US history happened in the Gulf of Mexico after the BP Deepwater Horizon drilling rig exploded. It was drilling 1,500 m below the surface of the ocean. Use your library and your internet skills to find out more about this disaster. Find out

1. what caused the disaster
2. how long it took to stop the oil spill and why
3. how the spill was stopped
4. how much damage to the environment was done
5. the cost to BP.
flaring of gas (n)  
the burning of gas which the oil company cannot or does not want to use

explosion (n) a sudden and dangerous bursting and loud noise

It's My Job

1 Environmental engineers give companies advice about how they can minimize the damage to the environment and how they can protect the environment. What kind of projects could they work on in the oil and gas industry?

Read about Lauro Ramos and find some of the projects he has worked on.

Lauro Ramos

I am a chartered environmentalist with an international oil company. In my job I give advice on things that affect the environment. Oil companies have to produce oil and gas but at the same time they have to try not to damage the earth. I have worked in many different projects. For example, I worked on the design of equipment to protect fish around offshore platforms. In another offshore project I reduced the flaring of gas. On land, I worked to protect wildlife habitats where we were laying pipelines. I work together with safety engineers. We all need to know the law in counties where we are working.

I studied mechanical engineering at university and then got a job with an engineering company. I carried out design studies for new oil platforms. I became very interested in the environment and then got a new job in the Safety and Environmental section. I gained a lot of experience there. Now I work for a large oil company and I work on many different projects. Sometimes I travel to different parts of the world.

People don't understand that the oil and gas industry tries hard to protect the environment. We take care to avoid accidents. Leaks, fires, and explosions can injure and kill people and also damage the environment. So we work hard to stop these things happening.

4 What was the first project he worked on after graduating from university?
5 Do you think he has to speak English? Why?
6 What do people not understand? Why do you think this is?

Vocabulary

Word Families

You can improve your vocabulary by learning word families, for example refine (v), refinery (n), refined (adj), unrefined (adj).

1 Complete the table below. Use a good English–English dictionary, like Oxford Wordpower, if necessary.

<table>
<thead>
<tr>
<th>Verb</th>
<th>Noun</th>
<th>Adjective</th>
</tr>
</thead>
<tbody>
<tr>
<td>pollute</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>damage</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>6</td>
<td>7</td>
<td>(un)protected</td>
</tr>
<tr>
<td>8</td>
<td>9</td>
<td>transported</td>
</tr>
<tr>
<td>10</td>
<td>11</td>
<td>leaked</td>
</tr>
<tr>
<td>globalize</td>
<td>globe</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>environment</td>
<td>13</td>
</tr>
<tr>
<td>14</td>
<td>seepage / seeps</td>
<td>16</td>
</tr>
<tr>
<td>spill</td>
<td>15</td>
<td></td>
</tr>
</tbody>
</table>

2 Complete the sentences below with words from 1.

1 The natural place where plants and animals live is the _________.
2 If a pipe carrying oil bursts, the oil causes _________.
3 Carbon dioxide is causing _________. warming.
4 New car _________. means that car engines are more efficient.
5 Oil companies produce oil but they also try to _________. the environment.
6 An oil tanker accident can cause serious _________. to the environment.
7 Industrial facilities have ways to stop _________. oil getting into water and soil.
8 In some places oil _________. slowly to the surface of the ground by itself.

2 Answer the questions.

1 What two things does Lauro tell us an oil company has to do?
2 Who does Lauro work with?
3 What must they learn about other countries? Why do you think this is?
Used oil can be refined into good-as-new lubricating oil. Oil doesn’t wear out, but it gets dirty or contaminated. It is easier and cheaper to recycle used oil than to make new oil from crude. One gallon of used oil can produce the same amount of motor oil as 24 gallons of crude oil and it only requires about a third of the energy. Why don’t we recycle more used oil? Think about collecting it, transporting it, teaching people about the value of it, and how the oil companies feel about it.

Professional skills

Writing emails

1 Read the email. Match the names with the jobs.
Ken Nadal       environmental engineer
Peter De Martino  engineering manager

Dear Peter
I have a project meeting on WEDNESDAY next week to discuss the pipeline at Ross Bay. I hope that you have now FINISHED your study of the possible landing sites. Could you please let me have your opinion about the different options BEFORE FRIDAY so I can prepare for the meeting?
Did you know that Dave McDonald is leaving the company? Don’t tell anyone!! 😊
Best wishes
Ken

2 Look at the notes about how to write good emails. Which rules did Ken Nadal break? How would you improve his email?

Writing good emails

1 Be polite, never rude. Show respect in your writing.
2 Greet people with Dear Mr / Mrs / Dr. Only use first names if the other person has agreed.
3 Be concise. Don’t write more than you need to, but don’t leave out important information.
4 You can use common abbreviations, e.g. inc., etc., but don’t use abbreviations such as Can u pls send info on … that are normally used in text messages.
5 Don’t use emoticons (😊) in business communication.
6 Use correct spelling and grammar.
7 Don’t use CAPITAL LETTERS to shout your message and don’t write everything in small letters.
8 Reply to an email quickly. If you need to do some work before sending the information, tell the other person. Thank you for your email. I’ll get back to you as soon as I have the information you need.
9 Never write something you don’t want others to see.
10 Don’t try to be funny.
11 Remember your writing says a lot about you.

Writing

An email

1 Peter De Martino, an environmental engineer, has reviewed three options for the landing site for an offshore pipeline. Complete his email to Ken Nadal, the engineering manager of the project, with these phrases.

a I recommend that you carry out a survey
b environmental conservation groups
c Regards
d the three options
e I will be happy to help
f cause problems
g poor quality land
**Checklist**

Assess your progress in this unit. Tick (✓) the statements which are true.

1. I can understand a text about oil pollution
2. I can pronounce two-syllable nouns
3. I can describe cause and result relationships
4. I can write effective emails

---

**Key words**

**Nouns**
- burst pipes
- detection
- disaster
- ecosystem
- environment
- habitat
- human error
- oil spill
- pollution
- tanker

**Verbs**
- avoid
- cause
- damage
- protect
- recommend

Look back through this unit. Find five more words or expressions that you think are useful.

---

2. You are an environmental engineer and you have reviewed four options for bringing a pipeline ashore at South Bay. Write an email similar to the one in 1 using the information below.

<table>
<thead>
<tr>
<th>Site</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Popular beach for local people and tourists.</td>
</tr>
<tr>
<td>B</td>
<td>Farming land. Farmers can farm again after pipeline is laid.</td>
</tr>
<tr>
<td>C</td>
<td>Good for flowers and butterflies. Construction will damage environment.</td>
</tr>
<tr>
<td>D</td>
<td>Hard ground rock. Expensive.</td>
</tr>
</tbody>
</table>

Recommendation: Meet local farmers and survey ground conditions at B before deciding.
Kick off

Match the different branches of engineering in the oil and gas industry a–h with sentences 1–8.

a  drilling engineering       e  mechanical engineering
b  electrical engineering     f  structural engineering
c  environmental engineering g  production engineering
d  process engineering        h  reservoir engineering

1. _________ is about finding ways to protect plants and animals and the environment and stop damage to the environment.

2. _________ is about designing, developing, and testing tools, engines, machines, and mechanical equipment.

3. _________ is about understanding the complex forces that will act on the platform and designing the platform to stand up to them.

4. _________ is about taking account of the flow rates, pressures, and temperatures of different fluids and the processes required to change them into a useful product, then deciding on the size and type of equipment required.

5. _________ is about getting the best oil and gas production results. These engineers study detailed diagrams of the field to help them.

6. _________ is about managing the technical side of drilling wells.

7. _________ is about designing, developing, and testing electrical equipment that is used to produce power and control systems.

8. _________ is about managing the reservoir and the well. These engineers watch the equipment and the oil and gas flow.

Reading

Oil platforms

1. Look at the pairs of adjectives. Underline the correct adjective for each picture.

a  stable  unstable           b  vertical  horizontal

(c) strong  weak               (d) deep  shallow

(e) floating  submersible

2. You are going to read about three types of platform that can be used for exploring for offshore oil. Read the descriptions and label the diagrams.

a _________  b _________  c _________
The semi-submersible drilling rig has vertical columns that are connected to pontoons below the water. They often have an engine. This allows them to move easily into position. The pontoons can be filled with water. This lets the rig go down into the water and makes it more stable. They can be used in water up to 300 metres deep.

Drill ships can move easily into position. They are able to drill in deep water of more than 1,500 metres. But in bad weather they are unstable.

The jack-up unit is like a floating platform with legs. It has to be pulled into position by a ship. When the platform is in position, the legs are lowered to the seabed and then the platform is lifted out of the water. It is stable and can be used in water up to 100 metres deep.

3 What are the advantages and disadvantages of each of these platforms?

<table>
<thead>
<tr>
<th>Advantage</th>
<th>Disadvantage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Semi-submersible drilling rig</td>
<td></td>
</tr>
<tr>
<td>Drill ship</td>
<td></td>
</tr>
<tr>
<td>Jack-up unit</td>
<td></td>
</tr>
</tbody>
</table>

4 Find these words in the text above. What do you think they mean? How do you know?

semi-submersible columns pontoons

Practise saying the words.

5 Work in pairs. You are going to read a text about offshore drilling. What special conditions offshore do offshore engineers have to deal with? Make a list.

6 Read the text. Which points did you think about? How many points did you think about that are not in the text?

7 Work in small groups. What are the advantages and disadvantages of ROV systems? Discuss.

In this unit
- reading about offshore drilling
- talking about ability
- developing the skill of listening for detail
- how to talk about measurements
- how to make and pronounce different types of questions
- how to listen actively

Challenges offshore

Platforms and pipelines, oil rig structures, and equipment used offshore are engineered by offshore engineers. It’s a difficult environment offshore. Weather conditions can change quickly. Rain, wind, ice, and the heat of the sun all have an effect. Equipment has to be strong to survive the weather as well as the power of the seas and saline (salt) conditions.

Structures are often located far from land and can be difficult to get to, especially in bad weather. If there is an accident, it’s a long way to the nearest hospital. Platforms have to have their own source of energy, fresh water, food supplies, materials, equipment, workers, and specialized engineers and technicians.

Working offshore can be dangerous. There is no room for mistakes. Even small mistakes can cost the company millions of dollars. Mistakes can cause pollution or damage to the environment and people can be injured or killed.

Companies are always looking for new technology to make offshore drilling, extraction, and transportation safe and cost effective. ROVs (remotely operated vehicle systems) are an example of modern offshore technology. They are used to check structures and conditions under water and to maintain and install structures and systems in the seabed. An ROV pilot operates the vehicle from the platform using electronic equipment.
manifold (n) a pipe with several inlets and one outlet or one outlet and several inlets
topsides (n) the part of the oil platform that is above water

Language spot
Talking about ability

Go to Grammar reference p.118

1 Complete the sentences with can / can’t and the active or passive form of the verb.
The semi-submersible drilling rig ________ 1 (move) easily into position but it ________ 2 (use) in deep water.
The drill ship ________ 3 (use) in bad weather, but it ________ 4 (use) in deep water.
The jack-up unit doesn’t have an engine so it ________ 5 (move) into position by itself. It ________ 6 (operate) in 100 metres of water but it ________ 7 (use) in deeper water.

2 Designers use CAD (Computer Aided Design) programs to create designs. These programs allow designers to create drawings in two dimensions (2D) or three dimensions (3D). Look at the list of features of CAD.
1 store drawings easily
2 display drawings
3 send drawings easily and quickly to other people
4 make calculations
5 rotate (turn) a design
6 view a design from different angles
7 change data quickly and easily
8 add standard designs
9 calculate volume, area, stresses, etc.
10 test some designs, e.g. electrical circuits
11 see the result of any changes
12 add colour and shading to make it easier to visualize

Use the information in 1–12 above to complete the text below. Put the verbs in the active or passive and add to if necessary. The sentences are in the same order as 1–12 above.

Engineers and designers use CAD programs to draw technical diagrams. These programs allow designers ________ 1 drawings easily. Drawings can ________ 2 and ________ 3 to other people. Designers can ________ 4 calculations and they are able ________ 5 and ________ 6 a design from a different angle. Designers are able ________ 7 data quickly and easily.
CAD allows designers ________ 8 standard designs and ________ 9 volume, area, stresses, etc. Some designs can ________ 10 and designers can ________ 11 the result of any changes. The program lets designers ________ 12 colour and shading to make it easier to visualize.

Listening
Listening for detail

1 Look at the map. The North Sea is an important area for oil and gas. Find the Britannia Gas Field. You are going to listen to Peter Gunn telling his friend about the Britannia Gas Field. First, work in pairs. Look at the fact sheet and decide what sort of information you will have to listen for.

![Map of the North Sea with the Britannia Gas Field highlighted.]

**Britannia Field**
- **Discovered:** ________
- **Distance to coast:** ________
- **Oil companies:** ________ and Chevron
- **Water depth:** ________
- **Location of sub-sea centre:** ________
- **Width of carrier pipe:** ________
- **Special feature of carrier pipe:** ________
- **Number of piles:** ________
- **Number of legs:** ________
- **Topsides accommodation unit:** ________

2 Listen and complete the fact sheet.
3 Listen again and check your answers.
The Yastreb drilling rig was designed and built in 2002 for the extreme conditions on Sakhalin Island. It was built to be strong in case of seismic events and to operate in temperatures down to -40 °C. The Yastreb drilling rig has drilled one of the deepest wells in the world. It is 11,282 metres deep and was drilled in 61 days.

Vocabulary
Talking about measurements
1. What are these different measurements? Choose a noun from the list.
   width  area  height  weight
   distance  length  depth

2. Look at these questions and answers.
   Length = 2.4 m
   How long is the pipe?
   It's 2.4 metres or it's 2.4 metres long.
   Diameter = 42 cm
   How wide is the pipe?
   It's 42 centimetres or it's 42 centimetres wide.
   What are the adjectives? Complete the list.
   **Noun**  **Adjective**
   width  wide
   height  1
   length  2
   depth  3
   weight  4

3. Choose the correct word in these sentences.
   1. Each pipe section is 10 to 15 metres **length / long**.
   2. How **weight / heavy** is the platform?
   3. The borehole is over 90 metres **depth / deep**.
   4. The structure is 50 metres **high / height**.
   5. How **width / width** is the pipeline?

   How big is the processing facility?
   It's 3,562,500 square metres.

Language spot
Asking questions
>> Go to Grammar reference p.118
1. Work with a partner. Match the *wh-* words with the answers.
   1. When  a. three years
   2. Where  b. the production engineer
   3. What  c. a CAD program
   4. Which  d. about 150 km from the coast
   5. Who  e. 105 metres
   6. Why  f. in December 1998
   7. How deep  g. the largest one
   8. How much  h. to prevent a blow-out
   9. How long  i. 2.3 billion barrels

2. Make a possible question for each answer. Practise in pairs.
   **Example**
   *When did gas production start?*
   *In December 1998.*

3. Two friends are talking about an oil pipeline. Complete the questions.
   A. The Baku-Tbilisi-Ceyhan pipeline begins in the oil field in the Caspian Sea.
   B. Oh! ________¹ does it end?
   A. In Ceyhan. It's on the Mediterranean Sea.
   B. ________² is it?
   A. It's 1,768 km long.
   B. ________³ the longest pipeline in the world?
   A. No. It's the second longest.
   B. ________⁴ did it take to build?
   A. About two years. From 2003 to 2005.
   B. ________⁵ oil can it carry?
   A. One million barrels a day.
   B. ________⁶ was the pipeline built?
   A. Because there is so much oil below the Caspian Sea and the oil has to be transported to other countries.
Pronunciation

1 🎧 Read and listen to the questions and complete the statements below with wh- or yes/no.

a The voice goes down at the end of ________ questions.

b The voice often goes up at the end of ________ questions.

1 Does ERD mean Extended Reach Drilling?
2 When did your course begin?
3 Are you a mechanical engineer?
4 Have you got an offshore safety certificate?
5 Why are oil companies exploring around Greenland?
6 Whose job is it to log a well?
7 Can you use CAD programs?
8 Would you like to work offshore?

2 🎧 Listen again and practise saying the questions. Now work in small groups and ask each other the questions. Write new questions and practise again.

Project

Find out about Extended Reach Drilling (ERD). Find:

- what it is
- why it is used
- an example of where it is used.

Enter Extended Reach Drilling into your search engine to find some useful websites.

Professional skills

Listening skills

When we are listening to someone, we can give the speaker encouragement and support by listening actively.

1 Karl is explaining ERD to a group of students in his class. Look at the picture. Who is listening?

Speaking

Sharing information

1 Do you find it easier or more difficult to get information over the telephone or face-to-face? Why?

2 Work in pairs. Each of you has information about the Sakhalin-1 project. Telephone your partner and ask and answer questions to fill the blanks. Use the question words from Language spot. Remember to check spelling and numbers.

USEFUL LANGUAGE
Can / Could you spell that, please?
Did you say 17 or 70?
Could you repeat that, please?
Sorry?

Student A, go to p.108. Student B, go to p.112.

3 When you have finished, check that your partner has noted the information correctly. What did you find easy? What did you find difficult?
2 How do you think Karl feels about these people?

3 What should you do to show that you are listening actively? Tick (✓) the correct column.

| You should ... | You shouldn’t ...
|----------------|------------------|
| look at the speaker | look at the speaker
| yawn or sigh | yawn or sigh
| check you understand what they are saying | check you understand what they are saying
| move around | move around
| show your interest in your face (smile, etc.) | show your interest in your face (smile, etc.)
| lean forward a little | lean forward a little
| look out of the window | look out of the window
| nod your head a little | nod your head a little
| look for things in your bag or drawer | look for things in your bag or drawer
| make sounds to show you are interested: really, oh, hm, yes, aha | make sounds to show you are interested: really, oh, hm, yes, aha
| scratch your head / face and rub your eyes | scratch your head / face and rub your eyes
| ask questions | ask questions

4 Work in pairs. Student B, describe something that happened recently or a technical project to student A.

Student A, listen actively to Student B.

When you have finished, swap roles and do it again. Discuss how you felt. When you were speaking did you feel encouraged by the listener? Why / why not?
8 Production

Kick off

Match the names of places (1–4) with the photos (a–d).
1 drilling platform
2 Floating Production, Storage, and Offtake facilities (FPSO)
3 gas gathering plant
4 gas pipeline

Listening

Floating Production, Storage, and Offtake facilities

1 🎧 Stuart McDermot has worked in the oil business for almost thirty years. He is talking to Hermann Peterson about his career. Listen to part A and answer the questions.
   1. When did Stuart begin working in the oil industry?
   2. Tick (✓) the places he has worked.
      Texas
      Saudi Arabia
      Venezuela
      Kuwait
      Nigeria
      The North Sea
   3. How did he begin his career?
   4. Where does he work now?

2 🎧 Listen to part B and answer the questions.
   1. What does an FPSO look like?
   2. How does oil arrive in the FPSO?
   3. What processing takes place on an FPSO?
   4. What happens after processing?
   5. Why are FPSOs used instead of sub-sea pipelines?

3 🎧 Listen to part C and complete the notes with facts and figures.

<table>
<thead>
<tr>
<th>FPSO</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Crew size: 50 to <em>a</em> people.</td>
<td></td>
</tr>
<tr>
<td>Bonga FPSO</td>
<td></td>
</tr>
<tr>
<td>Situated in Niger <em>b</em>.</td>
<td></td>
</tr>
<tr>
<td>Length: <em>c</em> m. Width <em>d</em> m.</td>
<td></td>
</tr>
<tr>
<td>Place of construction: <em>e</em>.</td>
<td></td>
</tr>
<tr>
<td>Fitted out in <em>f</em>.</td>
<td></td>
</tr>
<tr>
<td>Carries <em>g</em> tonnes of topside equipment.</td>
<td></td>
</tr>
<tr>
<td>The Bonga FPSO serves <em>h</em> sub-sea wells.</td>
<td></td>
</tr>
</tbody>
</table>

4. Do you think it is more interesting to work on a drilling platform or on an FPSO? Why?
In this unit
- listening about FPSOs
- the Past Simple and the Present Perfect
- reading about gas gathering in Kuwait
- finding out about the job of an oil installation manager
- asking for and giving updates

Language spot
Past Simple v Present Perfect

1 Look at sentences a and b. Which one uses
1 the Past Simple? 2 the Present Perfect?

Which sentence answers the question
3 ‘when did you work there’?
4 ‘where have you worked’?
a I’ve worked in Texas, Saudi Arabia, and Mexico.

2 Complete the sentences using the verbs in brackets in the Past Simple or Present Perfect.
1 __________ (you see) Muqtar yesterday?
2 He has a lot of experience — so far in his career he __________ (manage) an FPSO in the Gulf of Mexico and he __________ (even write) a book about offshore production techniques.
3 They __________ (leave) Oman five years ago.

3 Look at sentences c and d and answer the questions.
c I’ve worked in the oil business for over 25 years.
d I’ve been with this company since 1998.

1 Which tense do they use?
2 Is Stuart still in the oil business?
3 Is he still with the same company?
4 When do we use for and when do use since?

4 Make sentences with the Present Perfect.
1 They / exploit / that oilfield / more than twenty years.
2 He / work / on an FPSO / 2005.
3 How / long / you / be / oil business?
4 He / not / visit the platform / three months.
6 How long / you study / English?

5 Study the extract from Listening. Which question asks about experience? Which tense does it use? What is the short answer? Which tense does he use to ask his next question?
Have you ever worked in Africa?
Yes, I have.
When did you work there?

6 Imagine you are interviewing someone who has worked in the oil industry for a long time. Use the prompts to make have you / has he / she ever questions and expand the conversations.

Example
You / ever / fly in a helicopter?
Yes. To and from rig in the North Sea
Have you ever flown in a helicopter?
Yes, I have. I flew to and from the rig in the North Sea.

1 you ever / be / roustabout?
Yes. Two years in Texas 1988–1990
2 he ever / work offshore?
no
3 they ever / dive sub-zero temperatures?
Yes. They work / Sakhalin project / they make / lots of money

7 We often use the Present Perfect with the superlative to ask and answer about memorable experiences.
What's the biggest FPSO you have ever worked on?
The biggest FPSO I have ever worked on was in the Niger Delta.

Make similar questions and answers.
1 What / most frightening experience you / ever have
The most frightening experience / I / ever have / be five years ago. The helicopter / I be in / crash / into sea. We have to / wait / three hours to be rescued.
2 What / longest time / you ever work offshore.
The longest time I / ever work offshore / six weeks.

8 Complete the sentences by changing the verbs into the Past Simple or Present Perfect.
1 Malcolm Scott __________ (work) in the oil industry since 2004. Before that, he __________ (study) geology at university.
2 __________ (you ever / visit) an FPSO or oil platform?
3 They __________ (join) the company in 2003. Since then they __________ (work) in Kuwait and Iraq.
4 He __________ (study) oil and gas for three years at college, but now he is getting some practical experience.
5 People __________ (know) about the oil sands for hundreds of years.

>> Go to Grammar reference p.119
Kuwait puts 10% of its oil revenue into a fund to prepare for the day when the oil runs out. It invests this money mostly overseas. Do other countries have the same idea as Kuwait?

**Reading**

**Gas gathering in Kuwait**

1. Why do we always find some gas on an oilfield? What dangers does this present and how do oil producers deal with them?

2. Where in the world is most natural gas produced?

3. Read the article about gas gathering in Kuwait. Statements 1–6 are wrong. Correct them by continuing the second sentence of each pair.
   1. The Sabriya region has a new oilfield.
      I don’t think ________________________.
   2. Kuwait is going to continue with gas flaring.
      Really, aren’t they going to ________________________?
   3. Kuwait is going to export its natural gas.
      Are you sure? I think ________________________.
   4. The gas is transported to the distribution centre in its natural state.
      I’m not sure that that’s right ________________________.
   5. They have to reduce the pressure as it travels along the pipeline.
      That’s not right, they ________________________.
   6. Many people work in the desert stations.
      Well, I thought that ________________________.

**Kuwait’s hidden treasure**

Kuwait is a major oil exporter and has the world’s fifth largest oil reserves. It has recently been lucky and discovered enormous fields of natural gas in the Sabriya region. Some gas is always produced from the same reservoir as the oil. Flares sometimes burn this gas to get rid of it because of the risk of explosions. Kuwait, however, can use this gas to generate electricity to meet the country’s energy needs and to run desalination units for its fresh water supply. This will let Kuwait export its oil.

Gas gathering is where gas is captured and piped from the well head to the gathering centre where it is prepared for transportation to its final distribution centre. This involves dehydration (removing water) and the sulphur compounds that cause corrosion, particularly H₂S. Then its pressure has to be increased by compressors for transportation along the pipes.

Friction in the pipes reduces pressure and flow, so intermediate compressor stations are used every 10 to 40 kilometres along the pipeline to maintain pressure. A company from South Korea has built a gas-gathering plant for the Sabriya region. The high temperatures and the distant desert areas where the gas fields are located are important technical challenges. Equipment in these areas is controlled remotely. Quality and safety are extremely important. It is important to measure and correctly meter gas flows. The transmission of correct pressure and flow data to control stations ensure that that the gas arrives safely at its destination.

4. Put these steps in the correct order to produce a flow chart of the gas gathering and transportation process.
   a. Flow and pressure measurements are monitored at the control centre.
   b. The gas goes from the well head to the gathering centre.
   c. The gas arrives at the gas distribution centre.
   d. Intermediate compressors raise the pressure of the gas.
   e. Water and corrosive elements are removed.
   f. Gas pressure is raised by the compressors at the gas gathering centre.
Pronunciation
1 How is -sure pronounced in each case? Listen and check.
   1 measure  2 pressure  3 ensure

2 Which word in each list of four has a different sounding ending? Listen and check.
   1 a destination  b corrosion  c compression  d technician
   2 e explosion  f desalination  g friction  h transmission

3 Say these sentences.
   1 Our mission is to ensure that explosions do not occur.
   2 Friction and corrosion may cause pressure changes during transmission.
   3 Technicians regularly measure the pressure to ensure safety levels.

Project
Find out about the following topics. Produce a poster for one of them.
- What happens to natural gas when it arrives onshore
- Natural gas dehydration
- Natural gas compression and ‘dew points’ for hydrocarbons
- Sphere handling and safety
- Metering

It’s my job
1 Read about Mahmoud and answer the questions.
   1 How long has Mahmoud worked in the oil industry?
   2 What have been the different stages of his career?
   3 How many people does he manage?
   4 Who does he compare himself to?
   5 What does the platform produce?
   6 What, for Mahmoud, is the most important part of his job?
   7 How does he begin his working day?
   8 How does he keep up to date with what is happening on rig?
   9 Which part does he find most difficult?

2 Discuss the questions.
   1 Do you think Mahmoud is a good manager? Why / why not?
   2 How important is it that someone starts their career at the bottom?

Mahmoud Hamdi
I started with the company as a trainee mechanical technician from school and joined the company’s apprenticeship scheme. I worked in different departments in the onshore offices and workshops and did a Diploma in Mechanical Engineering. After safety training, I became a maintenance engineer on my first platform. Now, 23 years later, I have overall responsibility for the safe operation and performance of a platform and its 110 maintenance and operations personnel. In many ways I am like the captain of a ship.
We produce 30,000 barrels of oil every day. Safety is our top priority and we are always looking for ways to improve. My job involves a lot of planning. We are so far from shore that we have to be able to respond to equipment breakdowns, bad weather, and personnel problems. I am proud that I have a good understanding of the practical tasks my team does.
A typical day begins with a meeting with my supervisors. We discuss safety issues, maintenance, and operations. We also look at marine and helicopter logistics and communications from the onshore base. I always do a daily tour of the platform and speak to as many of the team as possible. Keeping in touch with everyone is important and improves performance. The worst part of the job is being away from my family, but after three weeks offshore I have three weeks onshore with my wife and children.

3 Find the nouns that we can make from the verbs and adjectives.
   1 Verbs: operate, perform, maintain, break down, supervise
   2 Adjectives: responsible, safe
Speaking

Updates

1 On a typical day Mahmoud discusses the following topics with his supervisors. Match topics 1-4 with situations a-d.

1 equipment breakdown
2 helicopter logistics
3 personnel problems
4 safety issues

a 'The lighting is out of order on section F gangway. Someone could fall'.
b 'We need to hire two divers for sub-sea maintenance'.
c 'The separator pump had stopped working'.
d 'The onshore base has cancelled flights because of bad weather'.

2 It is the next day. Mahmoud is asking two of his supervisors for an update. Listen and say which two problems from 1 they are discussing.

3 Listen again and complete the table.

<table>
<thead>
<tr>
<th>Problem</th>
<th>Situation 1</th>
<th>Situation 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Update</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Action</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4 Put the words in the right order.

1 pump / what / is / situation / separator / the / the / with
2 yet / identified / you / the / problem / have
3 I / already / installed / have / emergency / lighting / some
4 better / had / over / change / you / to / pump / the / replacement
5 have / I / it / tested / it / and / works / just
6 we / located / have / not / the / yet / fault
7 are / broken / you / on / getting / lighting / how / with
8 it / gone / has / week / wrong / times / three / this

5 Work in pairs. Take turns to role-play Mahmoud’s conversations. Student A, go to p.108. Student B, go to p.112.

Useful Language

Asking for a situation report / update
What’s the situation with ...?
How are you getting on with ...?
Have you done X (yet)?

Giving an update
I’ve already done it = some time ago.
I’ve just done X... = a short time ago.
We haven’t done X (yet).

Orders and instructions

- with the imperative
  Keep me informed.
  Keep on looking.
- with can and had better
  Can you find / tell me / inform me ...?
  You’d better do X.

Professional skills

What makes a good manager?

1 Read the checklist about what makes a good manager. Is there anything you would add to the list or take away?

A good manager ...

1 has first-hand experience of the jobs that people do
2 knows the people who work for him or her
3 walks around the site and speaks to staff
4 knows how to give orders and delegate
5 always follows up
6 encourages and praises when it is deserved.

2 What for you are the three most important things?
3 Is Mahmoud Hamdi a good manager?
4 What experience do you have of good managers?
**Writing**

**An email**

Mahmoud has written to Neil Ferguson, his replacement for the next three weeks. Using Mahmoud’s note as a model, write another email explaining the situation with the divers.

---

```plaintext
From: Mahmoud Hamdi  
Sent: 20 November 20—06:07:32  
To: Neil Ferguson  
Subject: Separator pump

Neil,

Sorry I missed you last time at the airport. You will see from the report that most of the work was completed, except the separator pump. The replacement pump was not on the last supply vessel. They have promised delivery next week either by boat or helicopter. I will chase up the warehouse tomorrow. Meanwhile we will be running on the standby pump.

All the best,

Mahmoud
```

---

<table>
<thead>
<tr>
<th>Br E</th>
<th>Am E</th>
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</thead>
<tbody>
<tr>
<td>chase up</td>
<td>chase down</td>
</tr>
</tbody>
</table>

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**Checklist**

Assess your progress in this unit. Tick (√) the statements which are true.

- I can explain the differences between FPSOs and drilling rigs
- I can ask and answer questions about my experience
- I can ask for and give updates
- I can understand a text about the gas gathering process

---

**Key words**

**Adjectives**
- corrosive
- enormous
- stable

**Nouns**
- career
- FPSO
- gas gathering plant
- maintenance
- personnel
- pressure
- priority
- site

**Verbs**
- gather
- generate
- meter
- monitor

Look back through this unit. Find five more words or expressions that you think are useful.
1 OPEC

1 Have you heard of OPEC? What is it and what does it do?

2 Before you read the article, try to answer the quiz.

   1 What does the E in OPEC stand for?
      a exploring c excellent  
      b exporting
   2 When was OPEC started?
      a 1960 b 1961 c 1962
   3 Which country wasn’t an original member?
      a Venezuela b Saudi Arabia c Libya
   4 How many members does OPEC now have?
      a 10 b 11 c 12
   5 What percentage of world petroleum resources do OPEC members control?
      a 35% b 45% c 55%
   6 The powerful US and British oil companies were known as the seven
      a brothers b mothers c sisters.
   7 The most important oil company today is
      a Gazprom b Saudi Aramco c Royal Dutch Shell.
   8 Petrobras is the oil company of
      a Malaysia b Venezuela c Brazil.

3 Read the text and check the answers. How many did you get right?

4 Read the text more carefully and answer the questions.

   1 How were oil-producing countries paid before OPEC was formed?
   2 How did OPEC manage to increase the price of oil?
   3 What happened to oil prices in the 1970s?
   4 Why is OPEC no longer as powerful as it once was?
   5 How did oil-producing countries gain control of their petroleum industries?
   6 How do you think the supply of oil and gas will change? Who will be the ‘Seven Sisters’ of 2050?

Oil and power

OPEC (the Organization of Petroleum Exporting Countries) was created in 1960 by Iran, Kuwait, Iraq, Saudi Arabia, and Venezuela. At that time the oil industry was still dominated by foreign oil companies operating in those countries. The governments of countries where the oil was found only received a share of these companies’ profits. Despite the increase of world demand for oil, the price continued to drop.

OPEC was formed to protect the interests of oil-producing countries. It is a cartel, that is, a club of producers. Members realized that they could get a fairer price for their oil by agreeing on how much oil to supply to the market. The law of supply and demand would do the rest. During the 1960s, OPEC gradually increased its influence. In the early 1970s, it caused a large increase in the price of petroleum by limiting production.

Currently there are eleven members, although countries do join and leave. Nowadays, OPEC has less influence over oil prices as there have been discoveries by non-OPEC countries. Nevertheless OPEC members still control almost half of the world’s oil supply.

From the early days of oil, through to the 1970s, American and British oil companies controlled the oil industry. Understandably, OPEC members wanted to take back control of the industry from the foreign oil companies that operated on their territory. Iran had already done this in 1951. By the mid-1970s the rest of OPEC had either completely nationalized their oil industries or had a majority control of their petroleum industry.

The ‘Seven Sisters’ were the most important companies and controlled most of the oil-wealth of the world. They were given this name by the Italian oil executive Enrico Mattei. The Seven Sisters were the members of a consortium that was created to reintroduce Iranian oil to the market after nationalization. They were

<table>
<thead>
<tr>
<th>Standard Oil of New Jersey</th>
<th>Standard Oil of California</th>
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<tbody>
<tr>
<td>Royal Dutch Shell</td>
<td>Gulf Oil</td>
</tr>
<tr>
<td>Anglo Persian Oil Company</td>
<td>Texaco.</td>
</tr>
<tr>
<td>Standard Oil of New York</td>
<td></td>
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</tbody>
</table>

However, since then, the power of these companies has declined as oil-producing countries have claimed the industry as their own. In addition, new discoveries and new companies have changed the face of the oil and gas industry. According to the Financial Times newspaper, the new Seven Sisters are (listed in order of importance)

- Saudi Aramco (Saudi Arabia)
- Gazprom (Russia)
- CNPC (China)
- NIIOC (Iran)
- PDVSA (Venezuela)
- Petrobras (Brazil)
- Petronas (Malaysia).
2 Zayed bin Sultan Al Nahyan

1 Read the article about His Highness Zayed bin Sultan Al Nahyan and choose the best title. Explain your choice.
   a A lost opportunity
   b A great leader
   c The story of a simple man

2 Read the text again and answer the questions.
   1 How big are the UAE’s petroleum reserves?
   2 How did Sheikh Zayed use money from petroleum to help his country?
   3 What did the international community think about him?
      Why?
   4 Did he live like one of the world’s richest men?
   5 What did he do to help wildlife?
      How was his work recognized?
   6 What is Masdar City and what are its aims?

3 How successful do you think Masdar City will be?

4 Does your country have an important person like Sheikh Zayed?

---

His Highness Zayed bin Sultan Al Nahyan was one of the founders of the United Arab Emirates and ruled Abu Dhabi for over thirty years. Abu Dhabi and the UAE have a tenth of the world’s oil reserves (and almost five per cent of its natural gas). Sheikh Zayed was a wise man who used the money from petroleum to help his people. Under his leadership Abu Dhabi became a rich and stable country. He built universities, hospitals, and schools and paid for medical treatment abroad for those who needed it.

He also helped to turn the desert green. He was a respected local and international figure who preferred discussion and negotiation to war.

Despite being one of the world’s richest men he lived a simple traditional life. He enjoyed riding and hunting with birds. Another love was for conservation and the environment. He helped to protect different kinds of wildlife in his region. He was awarded the World Wildlife Fund’s ‘Golden Panda’ for his work.

In memory of Sheikh Zayed, the ‘Zayed Future Energy Prize’ is for people and organizations that introduce new ideas in renewable energy (for example solar and wind power). Masdar City in Abu Dhabi is designed to be the world’s first eco-city. Researchers at Masdar City want to find solutions to climate change and energy security. Masdar City will only use solar energy and other renewable energy sources.
3 Peak oil

1 If you are looking for specific information, it's not necessary to read the whole text, chapter, or book. We use our reading skills to identify the part of the text where we expect to find the information we need. Look at questions 1–5. Find the answers in 30 seconds.

1 Who did William J Cummings work for?
2 What was M King Hubbert’s job?
3 What theory did Hubbert develop?
4 What did he predict in 1956?
5 Did his predictions about US oil come true?

2 Match the adjective with the correct meaning.

1 economic
2 rapid
3 scarce
4 conventional

a very quickly
b in a traditional or normal way
c connected with the organization of money, industry and business in a country
d in only small quantities

3 Now read the text in more detail and label the graph with the following words.
peak decline increase

4 Find the answers to these questions.

1 Why do people believe that oil production from conventional wells will decline?
2 What does ‘easy oil’ mean?
3 What does Hubbert’s bell-shaped curve tell us?
4 Why do some people think that oil production peaked at some time in the last ten years?
5 Why do some people believe that oil prices will increase in the future?
6 How will technology help produce enough oil in the future?

Are oil supplies now falling?

Over the last 150 years, there has been a rapid increase in the amount of oil produced around the world. The result has been a rapid economic growth and a higher standard of living. However, oil is a finite, non-renewable resource and many people believe that there will be a time when oil production (extraction and refining) from conventional wells begins to decline. This will happen when we have used up about half of the possible reserves.

Up until now oil companies have extracted oil from easy-to-reach places—on land, near the surface, under pressure, light and sweet. Now oil extraction is taking place offshore, in deep wells, and in environmentally sensitive areas and in the future it will become increasingly expensive to extract oil in these more difficult environments. In December 2005, William J Cummings, a spokesman for Exxon-Mobil company, said, ‘All the easy oil and gas in the world has pretty much been found. Now comes the harder work in finding and producing oil from more difficult environments and work areas.’
M King Hubbert was a geophysicist who worked for Shell Oil Company. He developed a theory known as the Hubbert Peak Theory which says that production of oil reaches a maximum point, or peak, and then begins to decline. He showed this in a bell-shaped curve. In 1956 he predicted that US oil production would peak sometime in the late 1960s or early 1970s and that world oil would peak sometime between 1995 and 2000. US oil production peaked in 1970/71.

Deciding on a time when world oil production will peak is very difficult. Most people agree that oil production will peak but they can’t agree when this will happen. Production from many of the world’s largest oilfields is now in decline and some people believe that oil production peaked up to ten years ago. However, new oilfields are beginning production and many people believe that the peak hasn’t been reached yet. We will only know when production has peaked after it has happened!

People also disagree about the results of peak oil. Some believe that as oil supplies fall, prices will rise because supply won’t meet demand and we will have to change the way we live dramatically. They say that products produced from oil will become scarce. Other people believe that developments in technology will mean that life will change very little. It is already possible to extract a higher percentage of oil from conventional wells. Oil can also be extracted from unconventional sources, for example heavy crude oil, oil sands, and oil shale, but production costs are high. Some people believe that new technology in transport and more efficient use of power will mean that the demand for oil will fall and that there will be enough oil to meet demand for many years in the future. If we control oil production carefully, there will be enough oil for the next hundred years.

<table>
<thead>
<tr>
<th>Verb</th>
<th>Noun</th>
<th>Adjective</th>
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<tbody>
<tr>
<td>increase</td>
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<td>grow</td>
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<td>economize</td>
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<tr>
<td>efficiency</td>
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**supply** (n) the amount of oil available

**demand** (n) the amount that people want to buy

**environmentally sensitive area** (n) an area of the environment that could be easily damaged and which we need to take care of carefully
4 Exploiting the Arctic

1 What do you know about the theory of ‘peak oil’? How true do you think it is?

2 What new resources of oil and gas that we know about have not been exploited yet?

3 Read the text and answer the questions.
   1 How many barrels of oil does the world consume each day?
   2 Which countries are interested in exploiting the Arctic?
   3 Why has this area become easier to exploit?
   4 What do these percentages describe?
      13% 30% 20%
   5 Who is Mark Myers?
   6 Why does Mr Myers think we need to have the survey information?
   7 What dangers does the Arctic face because of global warming?
   8 What other dangers could be caused by companies exploring for oil?

4 Look at the second paragraph and match the words in italics in the text with the definitions.
   1 __________ the people who have always lived in that place
   2 __________ __________ the increase in the world's temperature
   3 __________ animals, birds that live in their natural state
   4 __________ the ‘home’ of these animals
   5 __________ at risk
   6 __________ __________ very big dangerous animals that live in the Arctic

5 How many zeros are there in these numbers?
   1 ten 4 a million
   2 a hundred 5 a billion
   3 a thousand 6 a trillion

6 Write the large numbers in the text in full.
   a 86.4 million __________________________
   b 90 billion __________________________
   c 1,770 trillion __________________________

7 What do you think should happen in the Arctic?
5 Gas flaring

1 The picture shows natural gas burning at the end of a flare stack. In pairs, discuss where you would see this happening and why it happens.

2 Skim the first paragraph and see if the ideas in the text are the same as yours.

3 Scan the rest of the text and answer the questions.
   1. How much gas is estimated to be flared each year?
   2. In which country is the largest amount of gas flared?
   3. What happened in 2002?

4 Read the text in more detail and answer the questions.
   1. How does gas flaring act as a safety device?
   2. What happens at normal pressure?
   3. What is associated gas?
   4. Why were large amounts of gas flared in Nigeria?
   5. Why is gas flaring a problem?
   6. How do experts get information about the amount of gas being flared?
   7. What does GGFR aim to do?
   8. What does GGFR try to develop?

5 Complete the summary of the text using words from the text.

Gas is flared at oil and gas ________ but it is now considered to be a ________ of resources and money. Associated gas is burned when there is no demand for the gas or as a ________ device to reduce pressure in ________. Flaring of gas produces ________ gases that lead to global ________. GGFR is working together with oil companies and governments to ________ the amount of gas that is flared and to find new ________ for the gas.

---

A waste of resources

People throughout the world need energy but every year billions of dollars worth of natural gas are wasted. Natural gas is flared on oil production rigs, in refineries, and in chemical plants across the world. Flaring is the burning of natural gas which is not required or a way of reducing pressure at oil and gas facilities. People now realize that it is a waste of energy, resources, and money.

Pressure release valves release gas when the pressure in plant equipment is too high. This is a safety device to protect vessels and pipes. The released gases are burned as they leave the flare stack. When a large amount of gas is released, the flame burns very brightly. Even when pressure is normal, a small amount of gas is constantly burned so the system is ready.

In some countries, for example Nigeria, large amounts of natural gas are trapped with the oil as it is extracted. This is known as associated gas. Because there was little demand for natural gas in the country in the past the large quantities of associated gas were burned off. Oil companies are now working to reduce this.

Flaring and venting of natural gas from oil and gas wells is responsible for large quantities of greenhouse gases which are responsible for global warming. Experts estimate that over 150 billion cubic metres of natural gas are flared each year. This is about 25 per cent of the United States’ gas consumption or 75 per cent of Russia’s gas exports. Russia is responsible for the highest levels of flaring, followed by Nigeria, Iran, and Iraq. Information about the amount of gas flaring has been collected from satellite data.

Major oil companies and governments are now working together to reduce flaring and to recover and use this associated natural gas. The Global Gas Flaring Reduction Public-Private Partnership (GGFR) was set up in 2002. Its aim is to support governments, agencies, and the petroleum industry to reduce flaring and venting of gas. GGFR offers advice to governments and oil companies and also helps develop markets for the associated gas. Associated gas is now being used to supply domestic customers, and to produce electricity and liquefied natural gas (LNG).
6 Recovery methods

1 Read the text. Label the pie chart showing the success of different recovery methods.

2 Label the methods in diagrams a–c.
   primary recovery  secondary recovery  enhanced recovery

   a
   b
   c
Maximizing yield

When people think of striking oil, they imagine it gushing out of the ground in a huge jet.

However, in most cases making the earth give up its oil is much more difficult. A lot depends on the porosity of the rock that holds it, and the oil's viscosity (resistance to flow). In the old days, as little as ten per cent of the available oil was recovered. The technology was not available to bring the rest to the surface. With improvements in technology, up to 60 per cent can be recovered.

Primary recovery
Primary recovery depends on underground pressure to force the oil to the surface. If pressure drops, pumps can bring more oil up. Sometimes natural gas is pumped down the well below the oil. The gas expands and pushes the oil to the surface. Primary recovery usually extracts just ten per cent of the oil available.

Secondary recovery
This is the most common advanced recovery technique. Water that originally came out of the well with the oil is injected back into the oil-bearing formation. This forces more oil to the surface. Another 20 per cent can be recovered this way.

Enhanced recovery techniques
With enhanced recovery techniques, the amount that can be recovered increases to 60 per cent. There are three main methods.
(i) Thermal recovery
(ii) Gas injection
(iii) Chemical flooding

(i) Thermal recovery
Steam is injected into the formation to make the oil flow more easily. Its increased pressure makes it come to the surface. This method is used with very heavy oils like bitumen.

(ii) Gas injection
Gases like CO₂, propane, and methane mix with the oil. This lowers its viscosity and increases flow. Immiscible gases (gases that do not dissolve in oil) increase the pressure in the gas cap and force the oil up.

(iii) Chemical flooding
Chemicals are mixed with water and injected into the formation. This pushes out more oil.

A recent development
More recently, chemists have experimented with bacteria. Bacteria are injected into the formation and fed with protein like molasses (the sweet sticky substance that is left after sugar is refined). The bacteria produce gas that increases the pressure.

3 You are an expert on oil recovery methods. Give your advice to 1–4.

1 OK, we have recovered about ten per cent of the available oil. What do you think we should do next?

2 This oil is so thick it's almost like tar. What do you think we should do?

3 Do you know of any new methods to increase pressure to help the oil up?

4 The reservoir rock isn't very porous. How can we improve the flow of oil?
7 Life offshore

1 What do you think it is like to work offshore? What do you think would be the most difficult part and what would be easy?

2 You are going to read five short texts about working offshore and then choose the best heading for each text. First read the list of possible headings 1–7, then skim the five texts A–E and choose the best heading for each text. There are two headings that you don't need.

1 Adjusting to life offshore
2 Arriving on the rig
3 Living conditions
4 Food
5 Working hours
6 Leaving the job
7 Leisure facilities

3 Answer the questions.

A 1 Where do the workers eat lunch?
2 What kind of food is popular?

B 3 Does everyone work night shifts?
4 Do most people work fourteen days at a time?

C 5 Do people give up their job offshore because of bad conditions?
6 What happens between workmates?

D 7 Is the cinema similar to a cinema onshore?
8 What sorts of sports facilities are available offshore?

E 9 What safety equipment do you receive?
10 When are muster points used?

4 Look at the different definitions of turnover, galley, and shift. Choose the correct meaning for these words as they are used in the text.

A During the day we spend our breaks at ‘Tea Shacks’ or ‘Smoko Shacks’ at different places on the rig and we usually get sandwiches or cakes. Then at lunchtime, we take off our work gear and go to the galley. There’s always a wide selection of dishes on offer at mealtimes. We sometimes have international evenings, for example Chinese or Indian, when most of the dishes are from a particular region of the world and these are usually very popular.

B A ‘trip’ offshore is often two weeks. Most people work two weeks on and two weeks off. You may have to do night shifts but that depends on your job. Some people do one week of day shifts and then one week of night shifts before they return to shore. You have to work twelve hours each day but you get breaks and time for meals.

C You’re living and working in the same place and it takes time to get used to that. You’re completely surrounded by sea and can’t see any land. Some people simply can’t get used to this lifestyle so there is a high staff turnover. But it’s not as frightening or as tough as people believe. The conditions are really very good and the work isn’t any harder than a similar job in heavy industry on land. You have to get used to the jokes between workmates but people are not allowed to be unkind.

D When you’re not working there’s a good selection of things to do. There are computers with internet connection and computer games consoles and if you prefer to relax alone, each room has a TV. Our rig has a cinema where we can watch DVDs or TV programmes on a large-screen TV. If you want to be more active, there’s usually a well-equipped gym, table tennis or pool and snooker tables, and possibly a sauna.

E The first things you get are your safety boots, safety glasses, overalls, and a hard hat. You have to wear these. Then you have an opportunity to visit the whole installation. It’s important that everyone knows about alarms, drills, and muster points. These are the places where all personnel have to go if there is an emergency. Someone will show you where they are.

turnover /ˈtaʊnəʊ/ noun 1 (sing) ~ (of sth) the amount of business a company does in a particular period of time. The firm has an annual turnover of $50 million. 2 the rate at which workers leave a company and are replaced by new ones: a high turnover of staff 3 the rate at which goods are sold in a shop / store and replaced by others: a fast turnover of stock

galley /ˈgeɪli/ noun [C] 1 a long flat ship with sails, especially one used by the ancient Greeks or Romans in war. 2 the kitchen on a ship or plane

shift /ʃɪft/ noun 1 a shift (in sth) a change in opinion of or attitude towards sth: There has been a shift in public opinion away from war. 2 (in a factory, etc.) one of the periods that the working day is divided into; the group who work during this period. The shift has/have just gone off duty *to work in shifts * shift work/workers * to be on the day/night shift 3 [sing] one of the keys that you use for writing on a computer etc., that allows you to write a capital letter: the shift key
8 An international conference

1 What would you expect at an international conference?
   a An opportunity to meet people from a similar area of work from around the world
   b Experts talking about recent developments
   c Companies displaying their products
   d All of these

2 Skim the email and answer the questions in 30 seconds.
   1 Where does Manuel want Miguel to go?
   2 Why?
   3 What should Miguel do now?

3 Read the email in more detail and answer the questions.
   1 Does the conference of energy management always take place in Georgia?
   2 Do Eduardo Sanchez and Miguel Perez work at the same company?
   3 Who should register for the conference?
   4 Who should book the travel and accommodation?

4 Scan the programme for the conference and answer the questions in 30 seconds.
   1 Where is the conference taking place?
   2 When is it taking place?
   3 Who is Dr Dmitri Mammadov?
   4 Who will speak at 11 o’clock?
   5 What is Dr Talal Qasim’s job?
   6 What is the subject of Dr Saleem Sharma’s talk?

5 Read the programme in more detail. Who will talk about
   1 reducing gas flaring?
   2 the financial advantages?
   3 saving energy?
   4 ways to recover wasted gas?
   5 welcoming the guests?

---

Hello Miguel
The international conference of energy management is taking place in Georgia this year and the focus is flare recovery and gas reduction. As this is an issue we aim to address in the coming year, I would like one or two people from our company to attend. I suggest that you go together with Eduardo Sanchez.
I’m attaching the programme and would ask you to register for the conference and discuss your travel and accommodation arrangements with Maria Novak in administration.
Manuel

---

5th International Conference of Energy Management
National University of Georgia • 14th February 20—

The main focus of this year’s conference will be flare reduction and gas recovery – the technical challenges and financial implications of achieving zero flaring.

**PROGRAMME**

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
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<tbody>
<tr>
<td>8.30–9.00</td>
<td>Registration and coffee</td>
</tr>
<tr>
<td>9.00–9.15</td>
<td>Welcome address Dr Dmitri Mammadov, Professor of energy studies, National University of Georgia</td>
</tr>
<tr>
<td>9.15–10.30</td>
<td>Energy conservation and improving efficiency</td>
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<tr>
<td></td>
<td>Dr Hank Tegmeier, World Energy Solutions</td>
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<tr>
<td></td>
<td>Dr Tegmeier will address the economies of gas flaring and review the major challenges in reduction</td>
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<tr>
<td>10.30–11.00</td>
<td>Coffee</td>
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<tr>
<td>11.00–12.30</td>
<td>Technology for flare reduction</td>
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<tr>
<td></td>
<td>Dr Eduardo Haslam, Technical Director, Gas and Oil Consulting</td>
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<tr>
<td></td>
<td>This session will look at the technology to monitor gas flaring as well as ways of eliminating flaring</td>
</tr>
<tr>
<td>12.30–14.00</td>
<td>Lunch</td>
</tr>
<tr>
<td>14.00–15.15</td>
<td>Options for flared gas recovery</td>
</tr>
<tr>
<td></td>
<td>Dr Talal Qasim, Engineering Manager, International Gas Corporation</td>
</tr>
<tr>
<td></td>
<td>Dr Qasim will look at vapour recovery compressors and automatic injection systems and discuss the commercial options available</td>
</tr>
<tr>
<td>15.15–15.45</td>
<td>Coffee</td>
</tr>
<tr>
<td>15.45–16.45</td>
<td>Financial and operational challenges</td>
</tr>
<tr>
<td></td>
<td>Dr Saleem Sharma, Senior lecturer in corporate business, University of Delhi</td>
</tr>
<tr>
<td></td>
<td>Dr Sharma will consider the financial implications of achieving zero flaring</td>
</tr>
</tbody>
</table>
1 OPEC
1/2 Students’ own answers
3 1 b 2 a 3 c 4 b 5 b 6 c 7 b 8 c
4 They received a share of the companies’ profits.
2 It limited production.
3 There was a large increase.
4 Non-OPEC countries have discovered oil.
5 They nationalized their oil industries.
6 Students’ own answers.

2 Zayed bin Sultan Al Nahyan
1 b
2 1 It has one tenth of the world’s oil reserves.
2 He built universities, hospitals, and schools and paid for
medical treatment abroad for those who needed it. He also
helped to turn the desert green.
3 He was a respected local and international figure who
preferred discussion and negotiation to war.
4 No, he didn’t. He lived a simple traditional life.
5 He helped to protect different kinds of wildlife in his
region. He was awarded the World Wildlife Fund’s ‘Golden
Panda’ for his work.
6 Masdar City in Abu Dhabi is designed to be the world’s
first eco-city. It will only use solar energy and other
renewable energy sources.
3/4 Students’ own answers

3 Peak oil
1 1 Exxon-Mobil
2 geophysicist
3 Hubbert Peak Theory
4 US oil production would peak sometime in the late 1960s or
5 Yes
2 1 c 2 a 3 d 4 b
3 a increase b peak c decline
4 Oil is a finite, non-renewable resource.
2 Oil from easy-to-reach places — on land, near the surface,
under pressure, light and sweet.
3 It tells us that production of oil reaches a maximum point
or peak and then begins to decline.
4 Production from many of the world’s largest oil fields is
now in decline.
5 Because supply won’t meet demand.
6 It is possible to extract a higher percentage of oil from
conventional wells. Oil can also be extracted from
unconventional sources. New technology in transport and
more efficient use of power will lead to a decline in the
demand for oil.

5 Verb Noun Adjective
increase increase increasing
grow growth growing
economise economy economic
renew renewal renewable
produce 1 production 2 productivity
possibility possible
extract extraction extracted
difficulty difficult
agree / disagree agreement / disagreement
agreeable
decline decline declining
believe belief believable
develop development developed/
developing
technology technical
efficiency efficient
demand demand

4 Exploiting the Arctic
1/2 Students’ own answers
3 1 86.4 million
2 Russia, Canada, Denmark, Norway, and the USA
3 Global warming is melting the ice so it is easier to reach
the oil.
4 The Arctic holds about 13% of the world’s undiscovered
oil, 30% of the undiscovered natural gas, and 20% of the
undiscovered liquefied natural gas.
5 He works for the United States Geological Survey.
6 So that we can decide how to protect endangered species,
native communities, and the health of our planet.
7 loss of habitat
8 oil spills
4 1 native communities
2 global warming
3 wildlife
4 habitat
5 endangered
6 polar bears
5 1 10
2 100
3 1,000
4 1,000,000
5 1,000,000,000
6 1,000,000,000,000
6 a 86,400,000
b 90,000,000,000
c 1,770,000,000,000,000
7 Students’ own answers
5 Gas flaring
1/2 Where: at oil production rigs, in refineries, and chemical plants across the world
Why: the gas is not required or a way of reducing pressure at oil and gas facilities
3 1 150 billion cubic metres
   2 Russia
   3 GGFR was set up
4 1 When pressure increases, valves release gas which is then burned.
   2 A small amount of gas is burned to keep the system ready.
   3 The gas that is trapped with oil as it is extracted.
   4 In the past, there was little demand for the gas.
   5 It produces greenhouse gases that lead to global warming.
   6 From satellite data.
   7 Reduce the amount of gas being flared.
   8 New markets
5 1 facilities  5 greenhouse
   2 waste  6 warming
   3 safety  7 reduce
   4 equipment  8 markets

6 Recovery methods
1 a 10
   b 20
   c 30
   d 40
2 a thermal recovery
   b secondary recovery
   c primary recovery
3 Possible answers
   1 The first thing to do is pump water down the well, that will recover another 20% of the recoverable oil.
   2 We should inject steam into the oil – that will reduce its viscosity.
   3 The newest way is to introduce bacteria into the formation. The bacteria are fed with molasses and that produces CO₂.
   4 We can use chemical flooding, or else inject a gas like CO₂ into the formation.

7 Life offshore
1 Students' own answers
2 A 4 B 5 C 1 D 7 E 2
3 1 In the galley
   2 International
   3 No, it depends on the job.
   4 Yes (two weeks on)
   5 No, because they find it difficult to get used to the lifestyle there.
   6 They make jokes.
   7 No, because it plays DVDs not original films.
   8 Gym, table tennis, snooker or pool, sauna
   9 Safety boots, safety glasses, overalls, and a hard hat
   10 If there is an alarm.
4 Definition 2 for each word.

8 An international conference
1 d
2 1 to the International Conference of Energy Management in Georgia
   2 Because the focus is on flare recovery and gas reduction
   3 register and discuss travel and accommodation with Maria Novak
3 1 No – only this year
   2 Yes
   3 Miguel
   4 Maria Novak
4 1 The National University of Georgia
   2 14 February
   3 Professor of energy studies, National University of Georgia
   4 Dr Eduardo Haslam
   5 Engineering Manager, International Gas Corporation
   6 Financial and operational challenges
5 1 Dr Eduardo Haslam
   2 Dr Saleem Sharma
   3 Dr Hank Tegmeier
   4 Dr Talal Qasim
   5 Dr Dmitri Mammadov
9 Transportation and storage

Kick off

1 Identify the different forms of oil and gas transport and storage.

2 Work in small groups. Look at the diagram of country X. Which forms of transport do you think are used? Where? Why?

Listening

Pipelines

1 Work in small groups and discuss the questions.
   1 What are the advantages of using pipelines to transport oil and gas over other forms of transportation?
   2 What are the problems with pipelines?

2 Part A: Listen to Ken Lee talking about pipelines. Make notes.
   Advantage
   1 __________

   Disadvantages
   2 __________
   3 __________

   4 What are the problems with sub-sea pipelines?
   5 Name one example of a sub-sea pipeline that Ken gives.

3 Part B: Listen to part B. Answer the questions.
   1 What other problems does Ken mention?
   2 How do some countries monitor their pipelines?
Professional skills
Preparing visuals for a presentation

1 Work in pairs. Speakers often use visuals when they are giving a presentation. Why?

2 Discuss the last presentation you listened to. Did the speaker use visuals?
   • Were they easy to read?
   • Were they interesting?
   • How many were used?

3 Read this advice about using visuals. Did the speaker do these things?
   • Prepare well. Bad preparation is unprofessional!
   • The first visual should give the title of your talk.
   • Use bullet points but no more than five on each visual.
   • Never just read text from your visuals. Talk about each point.
   • Don’t use too many visuals – no more than one a minute.
   • Give your listeners time to read what is on your visual.
   • Use different colours to help your listeners understand.
   • Make sure the writing is big enough for everyone to see.
   • Use a pointer on the screen, not your hand.

Speaking
Using visuals in a presentation

1 Look at the visuals and listen to Ken Lee speaking about the trans-Siberian pipeline. Does Ken give any information which is not on the visuals? What?

2 Listen again. Answer the questions.
   1 How does Ken introduce the new topic of the trans-Siberian pipeline? ‘Now, __________.’
   2 What does he say when he starts the technical information? ‘Here __________.’
   3 How does he introduce the photo? ‘________.’
   4 What does he say about questions? ‘Are __________?’

3 Work in pairs. You each have some information about pipelines. Read your information and then prepare a visual or visuals for a short presentation. Look at the advice in Professional skills.

Student A, go to p.107. Student B, go to p.113.

4 Use your visual to give a short presentation to your partner. Use the phrases you wrote down in 2.

Listen to your partner’s presentation. Try to think of one question you could ask.
piracy (n) the crime of attacking ships to steal from them

Project

Find out about gathering, transportation, and distribution pipelines for oil and gas in your area. Where are they and how long are they? Do they cross borders from or into other countries? Have there been any problems there?

It’s my job

1 Why do accidents with large oil tankers happen?
Read about Eduardo Mendez, master of a large crude oil tanker, and see what he says.

2 Answer the questions.
1 What does Eduardo tell you that shows it’s not easy to control a large oil tanker?
2 What caused the Exxon Valdez disaster?
3 Why do people worry about oil tankers?
4 Why are there fewer oil spills now?
5 What is Eduardo frightened of? Why?

3 Find words in the text which mean the following.
1 something that happens and causes a lot of damage and harm
2 the people who work on a ship
3 the ‘roads’ in water where ships should sail
4 to try not to do something

Language spot

Comparative / superlative adjectives

Go to Grammar reference p.119

1 Oil tankers used for short journeys are _______ (small) tankers used on long journeys.
2 Transporting oil in pipelines is _______ (efficient) transporting it in tankers.
3 In 2008, crude oil was _______ (expensive) in 2009.
4 Double-hulled tankers are _______ (safe) single-hulled tankers.
5 Sub-sea pipelines are _______ (expensive) overland pipelines to build.
6 In bad weather, a jack-up unit is _______ (stable) a drill ship.

Eduardo Mendez

I have an interesting and exciting job, but I have a lot of responsibility. It takes nearly eight km to stop this ship and about three km to turn it. If I make a mistake and 200,000 tonnes of oil land on the beach, it will cause a great deal of damage to the environment and cost a lot of money to clean up.

There have been many examples of disasters. Some are caused because the ship’s crew are not properly trained, or they are over-tired. Because of this, it is important to have proper procedures and supervision. There’s a lot of competition between tanker owners, and crew members work long hours. Sometimes the crew don’t know about local conditions and can make mistakes. Some ships are not well maintained so leaks and spills can easily happen.

One of the largest oil spills in US waters was in 1989. The Exxon Valdez went aground in Alaska. It was sailing outside the shipping lanes because the captain wanted to avoid ice. Experts think the accident happened because the crew were tired, and there was poor communication between the officers in charge. It took years to clean up the area and it cost millions of dollars.

People worry about damage to the environment from tankers. But there have been fewer oil spills from tankers in the last twenty years. Modern oil tankers are double-hulled to stop oil spilling if there is an accident. But there are still some single-hulled tankers in operation. If there is a collision, they will spill most of their oil.

Today there is a new risk—piracy. Several tankers have been attacked by pirates off the north-east coast of Africa. I am responsible for the safety of my crew so this is frightening.
Seawise Giant was renamed Happy Giant in 1989, Jahre Viking in 1991, and Knock Nevis in 2004. Now it is a storage tanker and doesn’t go to sea any more.

M/T Hellespont Alhambra is now called Ti Asia and is still at sea.

Exxon Valdez was renamed Mediterranean and is still at sea.

Why do you think companies rename ships?

2 Complete the sentences with the superlative form of the adjective in brackets.

1. ________ (bad) oil spill in US waters was the Exxon Valdez.
2. What do you think is ________ (hard) job in the petroleum industry?
3. High quality oil is ________ (expensive).
4. ________ (efficient) way to transport oil is in pipelines.
5. The Britannia platform has ________ (large) piles in the North Sea.
6. The Middle East has ________ (big) oil reserves in the world.

3 Look at the information about three oil tankers. Complete the sentences with the comparative or superlative form of the adjectives in brackets. Remember to add than or the.

<table>
<thead>
<tr>
<th>Ship’s name</th>
<th>Capacity</th>
<th>Length</th>
<th>Date it started service</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seawise Giant</td>
<td>564,763 tonnes</td>
<td>458.45 m</td>
<td>1979</td>
</tr>
<tr>
<td>M/T Hellespont Alhambra</td>
<td>440,000 tonnes</td>
<td>380 m</td>
<td>2002</td>
</tr>
<tr>
<td>Exxon Valdez</td>
<td>200,000 tonnes</td>
<td>300 m</td>
<td>1986</td>
</tr>
</tbody>
</table>

1. The Seawise Giant is ________ (large) tanker.
2. The Exxon Valdez is ________ (small) M/T Hellespont Alhambra.
3. The M/T Hellespont Alhambra is ________ (long) the Exxon Valdez.
4. ________ (long) ship is the Seawise Giant.
5. The Seawise Giant is seven years ________ (old) the Exxon Valdez.
6. ________ (new) ship is the M/T Hellespont Alhambra.

Pronunciation

1. When we correct information, we often stress words strongly. Listen.

1. So, the trans-Siberian pipeline is 5,400 kilometres long?
   No, it’s 4,500 kilometres long.
2. So, you’re from Austria?
   No, I’m from Australia.
3. Is the tanker 300 metres long?
   No, it’s 380 metres long.
4. Is the oil well offshore?
   No, it’s onshore.

Work in pairs and practise these dialogues.

2. Work in pairs and correct the following information.

**EXAMPLE**

Did it start last month? (last week)

No, it started last week.

1. Is it cheaper by tanker? (more expensive)

2. Is it 130 metres long? (120 metres)

3. Is he working in Europe? (the Middle East)

4. Is the meeting on Thursday? (Tuesday)

5. Does it hold three million litres? (thousand)

Listen and check.
Reading
Liquefied natural gas

1. Work in pairs and discuss.
   - How is natural gas transported?
   - What is liquefied natural gas (LNG)?

2. Read the text and complete the diagram with the names of the different stages.

LNG
Liquefied natural gas (LNG) is natural gas that has been cooled to about \(-162 \, ^\circ\text{C}\). At that temperature it becomes a liquid and is \(1/600\)th of its original volume. It is easier to transport and store a liquid. Pipelines are often used to transport LNG but when it is not economical to build pipelines, LNG is transported in insulated containers. International trade in LNG is growing quickly. Natural gas fields are found in many countries, like Qatar, Indonesia, Algeria, and many more.

Natural gas is transported by pipeline to a liquefaction plant. Here, water, carbon dioxide (\(\text{CO}_2\)), and sulphur are removed so that pure methane (\(\text{CH}_4\)) remains. This is cooled to \(-162 \, ^\circ\text{C}\) and changes into a liquid. LNG is transported in specially insulated, double-hulled ships that can carry up to 260,000 m\(^3\). The LNG is kept in separate tanks at \(-162 \, ^\circ\text{C}\) at low pressure. Special insulation around the tanks keeps it cold. During the journey, a small amount of LNG changes back to a gas. This gas is used to fuel the ship.

When the ship arrives at a regasification terminal, LNG is pumped into onshore storage tanks. These are double-walled tanks that are very strong. When it is needed, it is reheated so it changes back to natural gas. It is then pumped through the local pipeline system to customers. Some LNG tankers have regasification facilities on board and can unload natural gas directly into the local pipelines.

3. Work in pairs. Discuss what happens at each stage. Talk about the different stages you identified in 2.
   **Example**
   Gas production
   What happens during gas production?
   Natural gas is produced and transported ashore by pipeline.

4. What concerns or worries might people living near liquefaction and regasification plants have?
### Vocabulary

#### Suffixes and prefixes

1. Complete the table with words from the text in *Reading*.

<table>
<thead>
<tr>
<th>verb</th>
<th>noun</th>
<th>adjective</th>
<th>adverb</th>
</tr>
</thead>
<tbody>
<tr>
<td>transport</td>
<td>transport / transportation</td>
<td>transportable</td>
<td></td>
</tr>
<tr>
<td></td>
<td>quick</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>insulate</td>
<td>2, 3, 4</td>
<td>fuel</td>
<td>5</td>
</tr>
<tr>
<td>5</td>
<td>store / storage</td>
<td>6, 7, separately</td>
<td></td>
</tr>
<tr>
<td>separate</td>
<td>separation</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. Underline the correct word.

1. When natural gas is cooled to \(-162^\circ\text{C}\), it becomes a **transport / transportable** liquid.
2. Companies use special tankers to **transport / transportation** LNG.
3. The use of LNG is growing **quick / quickly**.
4. The tanks are protected with special **insulate / insulation** to stop the temperature rising.
5. Companies **store / storage** LNG in special double-walled **store / storage** tanks.
6. LNG is transported in **separate / separation** tanks on the ship.

3. By putting a prefix at the beginning of a word, we can change the meaning. **Re-** at the beginning of a word means **again**. **Un-** at the beginning of a word means **the opposite**. Find examples in the reading text.

4. Match the prefixes with the correct meaning.

<table>
<thead>
<tr>
<th>Examples</th>
<th>Prefix</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>semi-submersible</td>
<td>semi</td>
<td>away from, not on</td>
</tr>
<tr>
<td>semicircle</td>
<td></td>
<td></td>
</tr>
<tr>
<td>sub-zero temperatures</td>
<td>sub</td>
<td>b three</td>
</tr>
<tr>
<td>sub-sea</td>
<td></td>
<td></td>
</tr>
<tr>
<td>microscopic</td>
<td>micro</td>
<td>c half</td>
</tr>
<tr>
<td>microchip</td>
<td></td>
<td></td>
</tr>
<tr>
<td>microwave</td>
<td></td>
<td></td>
</tr>
<tr>
<td>offshore</td>
<td>off</td>
<td>d too much</td>
</tr>
<tr>
<td>off-centre</td>
<td></td>
<td></td>
</tr>
<tr>
<td>midstream</td>
<td>mid</td>
<td>e small</td>
</tr>
<tr>
<td>midday</td>
<td></td>
<td></td>
</tr>
<tr>
<td>tricone</td>
<td>tri</td>
<td>f many</td>
</tr>
<tr>
<td>triangle</td>
<td></td>
<td></td>
</tr>
<tr>
<td>polycarbonate</td>
<td>poly</td>
<td>g below, under</td>
</tr>
<tr>
<td>polymer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>overproduction</td>
<td>over</td>
<td>h in the middle of</td>
</tr>
<tr>
<td>overworked</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5. Use a good English–English dictionary, such as *Oxford Wordpower Dictionary*, to find five more prefixes. Ask your partner to guess what they mean.
10 Refinery processes

Kick off

1 What does a solar still do? How can it make salty or dirty water pure enough to drink?
2 Study the diagram and number the steps.

Find a piece of glass, a container, and an empty tin to collect water.

a Put a little salty or dirty water in the bottom of the container. __________
b The water vapour condenses on the inside of the glass and becomes clean water. __________
c Let the distilled water run down the inside of the glass into the tin. __________
d Place the glass at an angle over the container. __________
e As the sun heats the water, it evaporates. __________
f First of all, take the piece of glass and make it black on one side. __________

Enjoy your drink, stay alive, and wait for help to arrive!

3 Match the words in italics in 2 with the definitions.
1 to change into a steam or a gas
2 made pure through heating to a gas and then cooling
3 on cooling, to change from a gas to a liquid

Reading

Refinery processes

1 What happens in an oil refinery? What do you know about the processes that happen in a refinery?
2 In Unit 3, we looked at the chemistry of hydrocarbons. What do you remember about the chemistry of crude oil?
3 Read about refinery processes and write T (true) or F (false).
   1 Crude oil contains four different carbon molecules. T
   2 Crude oil has many uses in its natural state. T
   3 Refining exploits the different molecular structures of crude. T
   4 The aromatic carbon molecule is the longest. F
   5 Longer carbon molecules have higher boiling points than shorter ones. T
   6 When a liquid distils, it becomes a vapour. T
   7 It is difficult to obtain gasoline from naphtha. F
   8 Cracking shortens the length of carbon molecules. T
   9 The gasoline we put in motor vehicles is a complicated mixture. T
   10 Sulphur helps to create acid rain. F

4 How similar is a solar still to an oil refinery?

5 After reading, find out the function of the following in the fractionating column.
   - the coker
   - the alkylation unit
   - the reformer
Crude oil

Crude oil is a mixture of four different types of hydrocarbon molecule known as paraffins, naphthenes, aromatics, and asphaltics. The first two are five carbon atoms or longer, aromatic has six or more, and asphaltic between forty and sixty. We can’t do much with crude oil in its natural state, but these different molecules give us the fuels and products we need. In order to use them, they have to be separated from each other.

An oil refinery’s first job is to break crude down into these different molecules. It does this by exploiting the structure of each one. The molecules have a different weight and boiling point according to the number of carbon atoms they contain. The crude oil is heated and is piped to the bottom of a distillation tower, also known as a fractionating column. The crude oil separates into fractions according to its weight and boiling point. The lightest fraction rises to the top of the tower as gas. The heavier fractions with the higher boiling points condense further down on trays at different heights and are separately removed as different cuts. These cuts go through other processes.

Gasoline (Br E = petrol) is the product with the greatest demand. It comes from naphtene. However, scientists can turn heavier crude into gasoline by breaking larger molecules down in a cracking unit. The fuel we put in our cars is a blend of different gasolines and additives. Other processes remove sulfur (Br E = sulphur), which is an impurity of crude oil. This is important for the environment, as sulfur is a key element in acid rain. As well as different kinds of fuel, the refinery produces the chemicals for other industrial processes.

It’s my job

1 Q Jassem Al Jarallah is the manager of a medium-sized refinery. Listen to the interview and complete the journalist’s notes.

Jassem Al Jarallah

Barrels processed each day __________ a.
Where it arrives __________ b.
Storage __________ c.
Impurities removed __________ d.
How it leaves the refinery __________ e / pipeline and __________ f.
What it supplies __________ g / __________ h and lube oil (lubricating oil).
Two main priorities:
1 __________ i.
2 __________ j.

Refinery safety. Makes refinery safe by regular maintenance. __________ k repairs and regular __________ l.

2 Would you like to do Jassem’s job? Why / why not?
The first oil refinery in the world was built in Poland in 1854. A large refinery opened in Romania in 1856. For many years the biggest refineries were in Abadan in Iran and Ras Tanura in Saudi Arabia. Currently, the world’s three biggest refineries are in Venezuela, South Korea, and India.

**Vocabulary**

**Phrasal verbs**

1. Match the phrasal verbs in sentences 1–7 with the definitions a–g. All these phrasal verbs appear in *It’s my job* or *Reading*.

1. If paraffin wax is allowed to *build up*, it can damage the pipeline.
2. They *carry out* a lot of additional processes after the initial refining.
3. We *shut* the column *down* for essential maintenance.
4. When sulphur dioxide combines with water vapour, it turns *into* acid rain.
5. I think the motor is *wearing out*. It’s making a strange noise.
6. Oh no, it’s the second time this month that the system has *broken down*.
7. At the refinery we *break* the oil *down* into its different molecules.

   a) close  
   b) transform / change  
   c) stop working  
   d) do  
   e) collect and increase  
   f) reduce  
   g) used so much that it is weak

2. What two different uses does ‘break down’ have?

3. Use each phrasal verb in 1 once to complete the sentences.

   1. The pump is really old and is ___________. We need to replace it before it ___________ completely.
   2. We will need to ___________ the refinery ___________ for several months to ___________ out important repairs.
   3. If we allow corrosion to ___________ in the system it will ___________ an even bigger problem.
   4. The way to handle a big task is to ___________ it ___________ into smaller individual tasks.

**Professional skills**

**Conversation and active listening**

1. Read the six tips for improving your conversation skills.

   1. Use the other person’s name.
   2. Begin questions with *So tell me* ...
   4. Summarize to show you’re following. *That’s the stuff we put on roads.*
   5. Use stress to check. *That’s by road tanker presumably.*
   6. Use rising intonation to ask for more information. *Lube oil?*

2. Listen to the conversation in *It’s my job* again. Put your hand up and tell the teacher to stop each time you hear one of the techniques in 1 being used.

3. Work in pairs or groups. Talk to each other about your job, interests, and hobbies. Use some of the tips from 1 to keep the conversation going.

**Project**

Jassem Al Jarallah says that sometimes his refinery has to shut down for maintenance. Find out

1. the parts of the refinery that need the most maintenance
2. the different types of problem that can occur with *piping* *heat exchangers* *valves* *storage tanks*
3. how often a refinery has to be maintained
4. how long they generally shut down for
5. if units are shut down independently.
**Listening**

**Loading terminals**

1. An oil terminal is a place where oil is delivered and stored. Where are the most important terminals in your country?

2. You are going to listen to a short talk about three oil terminals. Listen to part A and answer the questions.
   1. What is the main difference between Sullom Voe in Shetland and the Fawley terminal near Southampton?
   2. Listen again and complete the information about Fawley.
      - Number of tankers per day ____________
      - Number of storage tanks ____________
      - Barrels of crude processed each day ____________
      - Percentage of UK’s petroleum needs ____________

3. You are now going to listen to someone describing the Varandey oil export complex in the Arctic. What special challenges do you think oil workers face there?

4. Listen to part B of the talk and answer the questions about the Varandey oil export complex.
   1. How much did it cost to build?
   2. How does the oil get to the facility?
   3. How far out does the ice go?
   4. Why did they build the jetty so far offshore?
   5. How do they keep the area around the jetty ice-free?
   6. What is special about the jetty’s design?
   7. How big are the tankers it can it receive?
   8. What is the loading rate?

**Language spot**

**Forms of the verb**

Go to Grammar reference p.120

Complete the text by keeping the verb as it is, or by changing it into the infinitive or gerund.

---

**Ras Tanura**

Ras Tanura in Saudi Arabia handles most of the kingdom’s oil exports. Located on a peninsula, it started in May 1939 when the kingdom decided ________1 (export) crude oil. They soon needed ________2 (expand) the amount of space for tankers ________3 (load) the oil. This involved ________4 (build) South Pier which could ________5 (accept) 45,000-tonne tankers. North Pier followed later. Over the next decades, it became necessary ________6 (create) even more space. It was a great challenge but they succeeded in ________7 (construct) a number of artificial islands ________8 (receive) large tankers. This involved ________9 (build) them on piles. The most recent island can ________10 (provide) spaces for up to eighteen 500,000-tonne tankers. It is also able ________11 (service) LPG tankers. The Ras Tanura operation is as dynamic as ever. Saudi Aramco and Dow Chemical are planning ________12 (build) a huge plastics and chemicals plant at the site.
Corrosion costs the petroleum refining industry an estimated 54 bn a year.

**Corrosion and metals**
- **alloy** (n) a combination of two or more metals
- **chromium** (n) [Cr] metal used in heat- and corrosion-resistant alloys
- **corrosion** (n) chemical action on metals that weakens them. Also known as *rusting* in steel
- **nickel** (n) [Ni] used in stainless steel and high-strength steel alloys and for electroplating surfaces
- **stainless steel** (n) corrosion-resistant steel containing chromium and nickel
- **titanium** (n) [Ti] used to reduce corrosion particularly from sea water. Light, strong, but more expensive than stainless steel

### Speaking

**Problem solving**

1. Mehmet is a maintenance technician. He is talking to Samir, the head of refinery maintenance. Listen to their conversation and answer the questions.
   1. What problem has Mehmet identified?
   2. Has it happened before?
   3. What is the cause?
   4. When can they repair it?
   5. What material would Mehmet like to use?
   6. What does Samir suggest?
   7. How long will the work take?
   8. What does Samir and Mehmet have to do next?

2. Study the useful expressions and answer the questions.
   1. Which forms of the verbs follow the words in bold?
   2. Find
   a. two different uses of *should*.
   b. three different uses of *will*.

#### Saying what is necessary

We *really* must change it then.

We **need** to replace the section (active sense)

It (the section) **needs** draining first (passive sense)

#### Saying something is a good idea

We **should** use nickel or titanium

We **ought to** use more resistant materials

I’d **better** tell Mr Ali (I’d = I had)

#### Asking for and making a prediction

How long will the work take?

It will wear out more quickly. It won’t last as long

It should take two men about six hours

#### Making a promise / decision

I’ll schedule the manpower

I’ll do that

#### Making a request / order

Will you give me a list of the spares?

3. Pipelines have problems too. Work in pairs and follow the instructions on your file.

Student A, go to p.106. Student B, go to p.113.

### Pronunciation

1. **Listen and repeat.**
   1. Will you give me a list of the spares?
   2. It'll wear out more quickly.
   3. It won't last as long
   4. He'll want to know.

2. **Listen.** What do you hear — want or won’t?
   1. ________  2. ________  3. ________

### Writing

**Plant inspection report**

1. Mehmet and his team have carried out the work on the corroded pipework at the refinery. Read the job card and answer the questions.
   1. What did they do?
   2. What are the recommendations for further work?

2. Mehmet and his technicians’ comments are written in note form. Study the example, and expand the notes.

**Example**

Removed and inspected section. Traces of corrosion from sulphide attack. = We removed the section and inspected it. We noticed that there were traces of corrosion from sulphide attack.

3. Complete a job card for the work on the pipeline in the role-play you completed in Speaking. Use the headings and write it in note, rather than a full form.

<table>
<thead>
<tr>
<th>Br E</th>
<th>Am E</th>
</tr>
</thead>
<tbody>
<tr>
<td>spares</td>
<td>replacement parts</td>
</tr>
<tr>
<td>sulphide</td>
<td>sulfide</td>
</tr>
</tbody>
</table>
JOB CARD

Issue date: 23/08/20—
Area: Main refinery section 276/H
Job card number: DH891

Task description:
Drainage of section, replacement of corroded sections, re-gassing and testing.

Comments:
Removed and inspected section. Traces of corrosion possibly from sulphide attack. Replaced corroded pipe spool.
Note: Valves showing sign of wear. Recommend change at the next section shutdown.

Safety assessment control:
Normal. Instrumentation readings normal

Materials:
Pipe spool from workshop, plus gaskets and flanges

Supervisor:
Work complete, area clear, ready for use.
S. D. Bey.

Comments:
Suggest weekly monitoring of section. Replacement of valves at next shutdown. Issue work request to engineering for materials check and possible design change to improve corrosion resistance, before next shutdown.

Date: 27/08/20—
11 Downstream distribution

Kick off

1 Identify some of the customers of refined oil and gas products. What do they use these products for?

2 Match the customers in A with the uses in B. More than one use is possible for each customer.

A
- car owners
- domestic customers
- company making medicines
- road builders
- power stations
- plastics industry
- airlines
- machine builders
- transport companies

B
- to produce electricity
- to provide fuel
- to provide energy for cooking
- to provide grease / lubricants for mechanical parts
- to provide heating
- to provide raw materials to manufacture products
- to provide material for building roads
- to provide hot water

It's my job

1 Look at the two pictures of filling stations. Which one is owned by a large oil company and which is a small family business? How are these two businesses different?
In this unit
- making arrangements on the phone
- writing an email to confirm arrangements
- listening to understand how something works
- how to express approximate measurements
- reading about power stations
- using time clauses

2 Read about Mirjam Lee, a commercial manager. Answer the questions.
1 What are the three types of filling station Mirjam mentions?
2 How do small independents increase their business? Why?
3 What do drivers want?
4 What does she find interesting? Why?
5 Does Mirjam think there will be fewer cars in the future? Why?

Mirjam Lee
I am a commercial manager for a company that owns fifteen filling stations. When I left school I joined a national supermarket as a trainee manager.

There are three types of filling station. Some are owned by the large oil companies, for example Shell and BP. Some are owned by large supermarket companies, and some are independent. Most independents are small family businesses. They often sell used cars and do car repairs to increase their business. Because they are small, they find it difficult to get low prices for fuel from oil companies and fuel depots.
The most interesting part of my job is negotiating with our suppliers. It is sometimes difficult to get a good price and nowadays, the price of oil is more important than the brand. We sell about 40,000 litres a week. We also sell non-alcoholic drinks, snacks and some food. It’s my job to order goods that we sell. I check what each station sells well before I choose what to buy. Drivers want the cheapest fuel so I check the price at other companies regularly.

I have also helped buy and sell filling stations. That’s very interesting. There are often problems getting permission to build on a site. Decommissioning a site can also be difficult. Sometimes I meet people from the local government. There are sometimes changes in rules and regulations and we meet to discuss these.

I am sure there will be changes in the future with new fuels and new systems. However, people will never give up their cars. They need their cars if they live in places where there are not many buses or trains.

3 Find these words in the text and match them with the correct meaning.
1 depot a a piece of land for a building
2 site b the name of a product that is sold by a particular company
3 brand c to take equipment out of operation
4 decommission d a place where large amounts of fuel are stored

Speaking
Making arrangements on the phone

1 Victoria Mendez is the regional manager for Star Petroleum. She is phoning Mirjam Lee. Listen to their conversation and answer the questions.
1 Have Victoria and Mirjam met before? How do you know?
2 Why is Victoria phoning Mirjam?
3 What do they arrange?

2 Listen again and complete the sentences.
1 … vapour recovery installation. __________ at your office …
2 Yes, of course. __________ on Wednesday and Thursday. __________ Friday?
3 __________ 10.30.
4 Good. __________ confirm it with Mrs Tasker. I look forward to __________ then.

3 Work in pairs. Go to p.128. Read the telephone call together. Remember to sound pleased to speak to the other person.

Useful language
This is …
Could we meet at …
I’ll be …
How about …?
That would be fine.
Let’s say …
I look forward to seeing you then.

4 Work in the same pairs. Student A, go to p.109. Student B, go to p.113.
Professional skills

Telephone skills

1 Work in pairs. Discuss these questions.
   1 How often do you make telephone calls in English?
   2 How often do you receive telephone calls in English?
   3 Which do you find easier? Why?
   4 If you are going to make a work-related call in your own language, how do you prepare?

2 Read the suggestions about preparing to make a call.
   - Get all the necessary information ready – files, notes, computer files on screen, letters or emails you have received.
   - Have a pen and some paper ready.
   - Have your diary (Am E = planner) ready to make appointments.
   - Who do you want to speak to? If they aren’t there, what are you going to do?
   - Think about the other person. Where might they be now? What time is it in their country?
   - Do you want to find out information or give information?
   - Think about what you want to say and what the other person might say.
   - Decide what you want the result of the call to be.

3 Which suggestions do you do in your own language? How can you prepare to receive calls?

Writing

Emails

1 Victoria Mendez sends an email to Mirjam to confirm the meeting they discussed. Read the email.

Re: Meeting to discuss new regulations
From: Victoria Mendez [v.mendez@staroil.com]
To: Mirjam Lee

Hi Mirjam

This is to confirm our telephone conversation today. I have spoken to Rose Tasker, the local environmental officer, and we will be arriving around 10.30 a.m. next Friday 27th. You should be over your morning rush by then.

Mrs Tasker will want to see the vapour recovery installation. Can you also have the last two months’ delivery reports available, please?

See you then,
Regards
Victoria

Victoria Mendez
Regional Manager
Star Petroleum

This message is confidential. You should not copy or disclose its content except for the intended purpose. If you have received this email in error, please delete it together with any attachments.

2 Answer the questions.
   1 How does Victoria greet Mirjam in the email? When should you use this greeting?
   2 Look back at Speaking. Is there any unexpected information for Mirjam in this email?
   3 Does Mirjam need to reply to this email?
   4 Look at the small print at the bottom of the email. Have you seen this before? What does it mean?

3 Write an email to confirm the arrangements you made in Speaking 4.
Listening

Gas distribution

1 How does gas get from the terminal to people's houses and industry? Look at the diagram and identify any parts of the network you can.

2 Listen to Mark Scott talking about gas distribution and label the diagram with words from the list.

- offtake
- underground storage
- domestic customers
- governor
- LNG storage
- industry

3 Listen again and make notes about what happens at each point.

A
B
C
D
E
F
G
H

4 Work in pairs. Take turns to explain what happens at each stage. Student A, describe steps A–D. Student B, describe steps E–H.

Example
The compressor pushes gas through the system.

Vocabulary

Approximations

When we are not sure about an exact number or the number varies, we can give an approximation.

The pressure is about 85 bar.
We sell about 40,000 litres each week.

There is no exact number. Sometimes it is higher and sometimes lower.

We can use: roughly, around, approximately.
Approximately is more formal and is often abbreviated to approx. in writing.
Just below / under, nearly, almost tell us the number is below.
We sold nearly 40,000 litres last month. (The exact figure is 39,100).
Just over tells us the number is higher.

Rewrite these sentences using a word of approximation and a round number.

Example
The piles are 111.54 m deep.
The piles are approximately 110 m deep / just over 110 m deep.

1 The temperature at the top of the tower is between 19.3 and 20.6 °C.
2 The equipment costs $3,087.
3 In 2009, oil prices fell to $79.40 a barrel.
4 The pipeline is 1,826 km long.
5 This pipe is 14.6 cm diameter.
6 I started work at 7.02 a.m.
7 I have worked in Kuwait for six years, ten months, and twelve days.
8 The container weighs 41.29 kg.
9 The rigs are located 143, 146, and 153 km from the coast.
10 The estimated amount of gas is 460 to 480 billion cubic metres.
turbine (n) an engine with blades on a shaft which turns, driven by steam or gas. The blades in the turbine rotate (turn).
What shape are the blades? Why?

Reading

Power stations

1 Water is a liquid. When we heat it, it changes into a gas. When we cool it, it changes into a solid. What are the names for the solid and the gas?
[________ (solid)] [water (liquid)] [________ (gas)]
What do we need to change it from a solid to a liquid and from a liquid to a gas?

2 Read the text and choose the correct heading for each paragraph.
a Making it more efficient
b Cooling the water
c Making electricity
d Where electricity comes from

3 Work in pairs. Look at the diagram of a solid fuel power station. Draw arrows (↑↓) in the boxes to show which direction water, fuel, and steam are moving.
Cover the text and use the diagram. Student A, describe how electricity is made. Student B, describe how steam is cooled.

4 Many countries are now looking for other ways to generate electricity. Why?

5 Find out how electricity is produced in your country.

Producing electricity

1 We use electricity in our homes, factories, offices, and hospitals. Most of the electricity we use is produced by electricity generators in power stations. Many of these power stations burn fossil fuels, coal, oil, and natural gas to operate the generators.

2 In the power station, fuel is burned to produce heat. The heat changes water in a boiler to steam. This then passes to a steam turbine. A turbine consists of blades fixed on a shaft in the centre. As the steam passes into the turbine, it makes the blades and the shaft spin around very quickly. The shaft is connected to an electrical generator. Inside the generator there is a large electromagnet. As the shaft turns, it creates a magnetic field. This causes an electric current to flow.

3 After the steam leaves the turbine, it passes into a condenser. Here, the steam changes back to water as heat from the steam transfers to cold water in the condenser pipes. This water then has to be cooled. It is pumped to a cooling tower. As it falls it cools. The cooled water can be recycled.

4 Changing the energy in fossil fuel to electricity is not very efficient. There is a lot of wasted heat energy in the waste gases and in the condenser. Modern combined heat and power (CHP) units use this heat. It is sent to industry or homes near the power station to provide heating and hot water.
2 Read about Jaspal Rai. Complete the text with suitable time words.

I finished college, I wanted a technical job. I applied for different jobs I saw an advertisement for an apprentice gas distribution worker. you do an apprenticeship you can earn money and learn at the same time. I'm better at doing practical things but here I'm learning different skills too.

I work at a gas terminal. We check the quality of the gas. Then we heat and mix the gas it is distributed. My job is fault-finding and repair. Each day I start work I go to the control room and see the shift engineer. a fault is reported we get a job card. I finish the job cards, I do routine maintenance. We have to get permission we go onto the site. We usually fill in a permit request form two days we do the work. I started work I did lots of training. I had to learn about safety and fire operations. I find it easier to learn someone shows me what to do.

<table>
<thead>
<tr>
<th>Br E</th>
<th>Am E</th>
</tr>
</thead>
<tbody>
<tr>
<td>fault</td>
<td>problem</td>
</tr>
</tbody>
</table>

**Project**

1 Is liquefied petroleum gas (LPG) used in your country? What is it used for?

2 LPG can be used as a fuel in vehicles. It is known as autogas or autopropane (Am E = LP or propane). Do you know anyone who uses LPG in their car? Find out about LPG as a car fuel. Make notes under these headings.

What is LPG?
What are the advantages of using it as a motor fuel?
What are the disadvantages?
What else can it be used for?
Kick off
1 Look at the cartoon. What does it tell us?
2 Can you think of a time when poor communication caused problems with a project?

Reading
Different phases of a project
1 What are the main stages between discovery and production? What do you think happens between the pictures?
2 Read the passage. Match the comments a–g with sentences 1–7 in the reading text.

- OK, there's oil down there, but can we make money from it?
- So how much do you think a barrel will cost in 2025?
- What will people think of us if we destroy the wildlife in the area?
- Sven Hanssen is a great manager. He'll finish this part of the job on time.
- We've found it!
- The project has got the green light, now we can go ahead and plan in detail.
- I think we can work with these people. Let's give them the contract.
Discovery to production

The process that begins with discovering oil and ends with exploiting it is long and difficult [1]. From start to finish it can take as much as eight to ten years, especially if the company has to drill in deep water or arctic conditions. After the discovery, the process begins with studies to see if the field can be exploited at a profit [2]. The oil company has to estimate the future costs of pumping out the oil and getting it to market and predict the prices of oil and gas in many years’ time [3]. The company also has to think about the risks the project could bring. These risks can be financial and political; if they are badly judged, they might even damage the company’s reputation [4]. For example, if they destroy the habitat of an endangered species, this could bring them a lot of bad publicity.

If the company still believes the project is viable and it can obtain the finance, then the detailed planning can begin [5]. The aim is to finish it on time and not go over budget. Next, senior managers in the oil company have to choose the consultants and contractors [6] that can bring their knowledge and skills to each stage of the project. The consulting firms and contractors examine the project and bid for different parts of it.

These firms have their own teams and suppliers. During the project, thousands of people can be involved. At each level, the project has to be checked and coordinated. The hundreds of smaller projects that make up the entire project have to be managed. Each job has its own list of tasks and deadlines. Perhaps the most important factor is to have a good project manager and realistic schedules [7].

Listening
Planning and cost

1 Listen to four extracts from different conversations. In which one is the person
   a talking to a designer? __________
   b speaking to a supplier? __________
   c saying ‘no’ to a colleague? __________
   d talking to his team? __________

2 Listen again and answer the questions.

   Extract 1
   1 What is the speaker waiting for?
   2 When is the deadline?
   3 What is happening tomorrow?

   Extract 2
   4 Can they move the deadline?
   5 Why is it important to finish the task?
   6 What does he tell Mustafa and Ranjit?

   Extract 3
   7 What is the first thing the speaker has to do?
   8 What is the second thing on his list?
   9 How soon can he help his colleague?

   Extract 4
   10 What does the speaker want from the designer?
   11 Why?
   12 How detailed does it have to be?

3 Match the words that have been underlined with the definitions. Use their context to help you.

1 the final time by which something must be ready or finished
2 to offer to work for a certain price in competition with other suppliers
3 the amount of money you decide you can spend on something
4 a timetable that gives the order of tasks
5 possible to do and still be successful
6 experts who can give advice
7 the people who perform the work
8 calculate a cost, the time something will take
**Language spot**

**Obligation and necessity**

1. Look at the examples and complete the rules.

   *We must do everything to finish it.*
   *I must get back to work now.*
   *We mustn’t miss this deadline.*
   *I have to show something to the design group.*
   *I need to have it by five o’clock this evening.*
   *You don’t need to do anything too detailed at the moment.*

   1. Use __________ for strong orders to others and yourself.
   2. Use __________ for a strong negative order/prohibition.
   3. Use __________ / __________ to talk about duties and things that are necessary.
   4. Use __________ for things that aren’t necessary.

   - We usually use have to and need to to ask about general rules or laws and requirements. Remember, we don’t use must as much as have to or need to.
   - Do I have to / need to have a certificate from a doctor?
   - Do you have / need to ask about things that are necessary / not necessary for people in general?
   - Do you have to wear a uniform?

2. What do you say in the following situations?

   1. These three things are top of your ‘to do list’. They are all very urgent. Tell a colleague.
      a. find out the cost of parts
      b. work out how long it will take
      c. prepare an estimate for a job
   2. Tell a colleague that it is prohibited to smoke or bring drinks into the design office.
      You ________________________
   3. Ask a colleague if it necessary to wear a uniform.
      Do I ________________________?
   4. Reply to your colleague. Say it isn’t necessary, but that wearing a hard hat is a rule.
      No, you ________________________ but you ________________________ a hard hat.

5. You need to finish an assignment by this evening. This is your deadline. Give yourself a strong order.
   I really ________________________ it ________________________ be late!

6. A colleague keeps asking you to help him when you have your own work to finish.
   I’m sorry, but ________________________.

**Go to Grammar reference p.120**

**It’s my job**

1. Read what Phil Khan says about his job and answer the questions.

   1. Where does Phil work? What does his firm do?
   2. What is Phil’s current project?
   3. What does he hope will happen with the project?
   4. What will this mean for the company?
   5. What could this mean for Phil and his career?
   6. What would he be in charge of?

2. Read the text again and list the following.

   1. The tasks that Phil’s firm performs
   2. The technical skills a project manager needs
   3. The management skills a project manager needs

3. How does Phil manage to deal with such a difficult and responsible job? Would you like this kind of responsibility one day?

4. Match a word from A with one from B.

   A
   - project
   - time
   - top
   - risk
   - major
   - purchase
   - cost

   B
   - plan
   - equipment
   - order
   - manager
   - estimate
   - management
   - priority
I am a project manager for an international design contractor. My present project is a design for an FPSO—a floating production, storage, and offtake facility. We develop the design chosen by the client oil company. We also have to prepare time plans and cost estimates. Another part of the job is risk assessment and preparing purchase orders for major equipment. If the company and its finance partners decide to continue with the project, they may ask us to do the detailed design and supervise the construction. There would be work for hundreds of designers and support staff over several years.

A project manager needs to understand basic design and construction engineering. In addition he needs to know how to control costs, planning, purchasing, and risk management. He needs to be a team player but know how to make important decisions too. He also needs to be able to manage his workforce. The project manager is the person who speaks directly to the client. His top priority is to complete the project on time and within budget to the customer’s satisfaction while making a profit on the contract.

I began working as a piping engineer after I graduated from university. This is my third project and I am hoping that if it goes ahead, I will be its project manager. I would manage a team of several hundred engineering and support personnel. It’s a huge responsibility and I have a long and busy working week. I have chosen a good team and I have learned how to delegate and manage my time properly. I have time to relax, although I’m always thinking about the project.
Surround yourself with the best people you can find, delegate authority, and don’t interfere. Ronald Reagan, 40th president of the USA

Speaking
Delegating and monitoring progress
1 Yaseen Abdullah is having a meeting with his team: Fawzi Mohamed, Dave Summers, and Kithsiri Singh. Listen and answer the questions.
   1 What is the problem with the instrument panels? What does Yaseen suggest?
   2 Why hasn’t the technical team replaced the valves? What action does Yaseen suggest?
   3 Who does Yaseen ask to handle the flare replacement project? What support does Yaseen promise him?

2 Go to the listening script on p.129. Find examples of where Yaseen and Dave do the things below.
   1 Telling someone to do something
   2 Giving an indirect order
   3 Promising action

Vocabulary
Phrasal verbs
1 Match the phrasal verbs in the list with the definitions.

<table>
<thead>
<tr>
<th>English</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>chase up</td>
<td>carry out</td>
</tr>
<tr>
<td>get on with</td>
<td>fall behind</td>
</tr>
</tbody>
</table>

   1 lose time on a schedule
   2 perform a task
   3 cause a delay
   4 contact somebody in order to remind them to do something
   5 spend extra time doing something because you haven’t done it earlier
   6 make progress

2 Tell each other about a time when
   • you had to chase someone up
   • you carried out a task on time
   • you had to catch up on a project that was falling behind
   • something held up your progress
   • you couldn’t get on with something because of too many interruptions.

Speaking
Organizing an exhibition
You have been asked to organize an exhibition about careers in the petroleum industry. Work in groups of three or four. Student A, go to p.106. Student B, go to p.109. Student C, go to p.110. Student D, go to p.113.
Writing

The minutes of a meeting

1 Read these minutes from a meeting. Who was there and what did they decide?

2 How many columns are used? What does each one show?

3 The minutes do not use full sentences. How are these ideas reported in the minutes?
   The lack of progress on the flare tip replacement is due to illness.
   We agreed to recruit an extra engineer.

4 Expand another section from the minutes into a full sentence.

5 Create the minutes of the meeting that Yaseen ran.

---

Wednesday 9th April 20—10.30 Conference Room 2

Present

Four Star
Kevin Appleby
Project manager

KDP
Suresh Sharma
Project manager

Darius Geiger
Engineering manager

Brian Deacon
Contracts manager

---

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Action</th>
<th>End date</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>Safety</td>
<td>KA</td>
<td>11/4</td>
</tr>
<tr>
<td></td>
<td>Office building evacuation unsatisfactory.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Organize new practice drills.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.0</td>
<td>Progress</td>
<td>DG</td>
<td>7/05</td>
</tr>
<tr>
<td></td>
<td>Lack of progress flare tip replacement due to illness. Agreed to recruit an extra engineer.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Back on schedule in next two weeks.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.0</td>
<td>Procurement</td>
<td>SS/BD</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Approval required for new pump.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Waiting for three bids / quotations.</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>Chase up quotations.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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Checklist

Assess your progress in this unit. Tick (✓) the statements which are true.

- I can talk about the different stages of a project
- I have a better understanding of project management and the supply chain
- I can talk about obligation and necessity
- I can delegate effectively
- I can ask people to do things
- I can produce the minutes for a meeting

Key words

Adjective
viable

Nouns
budget
deadline
estimate
progress report
schedule
team

Phrasal verbs
catch up
chase up (Am E = chase down)
get on (with)
go ahead
hold up

Verbs
brief
delegate
plan

Look back through this unit. Find five more words or expressions that you think are useful.
13 Safety and risk management

Kick off

1 Label the safety equipment with the words in the list.
   hard hat    safety boots    ear protectors
   lifeline    harness    eye protectors / goggles
   overalls    gloves

3 How can the safety equipment deal with the hazards and reduce the risks?
   hazard (n) a thing or action that can be dangerous
   risk (n) the possibility of something bad happening in the future

Speaking

Warnings and reminders

1 🎧 Before his team begins a task, foreman Alec Barnard talks about the risks they face. Listen and answer the questions.
   1 Where are they working and what are the conditions?
   2 What does he tell them to wear?
   3 What safety equipment do they need to use?
   4 What special danger does he talk about at the end?

2 🎧 Look at the picture. Which rules and regulations are the men breaking? Listen again and check if you are right.

2 Look at the different people at work.
   1 Identify the hazards.
   2 What risks are they taking?

<table>
<thead>
<tr>
<th>Br E</th>
<th>Am E</th>
</tr>
</thead>
<tbody>
<tr>
<td>overalls</td>
<td>coveralls</td>
</tr>
<tr>
<td>mate</td>
<td>buddy</td>
</tr>
<tr>
<td>Mind your head</td>
<td>Watch your head</td>
</tr>
</tbody>
</table>
3 🎧 Listen again and complete the sentences for warning and reminding.
1. It is also going to be slippery up there, so lifelines ____________________________.
2. ____________________________ check that the colour coding on all equipment is up-to-date.
3. ____________________________ that the lifelines and harnesses are in perfect condition.
4. ____________________________ work directly over or under one of your mates.
5. ____________________________ tools lying around.
6. ____________________________ your heads when you go up between levels.
7. ____________________________ to keep your hard hats and eye protectors on at all times.
8. ____________________________ attach your lifelines to an eye hole.
9. One last thing: ____________________________ seabirds. They can be dangerous!

4 Your team is going to load some drilling pipes onto a lorry. There is a crane on the back of the lorry and chains will hold everything in position. They are going to use a fork-lift truck. Create a short talk warning them about the dangers. Decide
1. what dangers the team faces
2. what equipment they need to wear
3. what safety precautions they have to follow.

5 Study the two situations. What will you do?
1. A member of your team has been hurt. A tool has fallen his head from a level up. He was not wearing a hard hat. One of his colleagues gave him first aid and has taken him to the sick bay.
2. A member of your team has hurt his hand. He was trying to put a cable back in a pulley. His hand became trapped. It is badly injured.

Listening

Targets, metrics, and risk

1 Read the definition of ALARP. Do you think it is ever possible to completely remove risk?

ALARP /'eləp/ a rule used in the design of safety critical areas. It stands for As Low As Reasonably Practicable.

2 🎧 Peter Astley worked in the oil business for more than thirty years. Here he discusses the different types of risk oil companies face. Listen to part A, and answer the questions.
1. Does Peter think it is possible to have zero-level risk?
2. At which stage of a project is ALARP used?
3. Why do companies set themselves safety targets?
4. Complete the example of a fair target: '__________ shifts lost from accidents for every __________ man hours worked'.
5. What are 'metrics'?

3 Read the definition. Why are foreign companies afraid of nationalization?

nationalize (v) to put a company under the control of its government, which becomes the owner; nationalization (n)

4 🎧 Listen to part B, where Peter Astley discusses other kinds of risk, and answer the questions.
1. What happens if a company drills a 'dry well'?
2. Make notes about the three kinds of political risk he describes. What does he say about
   a. war?
   b. nationalization?
   c. 'rule-changing'?
3. What other risks are there in Nigeria?
Piper Alpha was a North Sea oil production platform. It contributed about 10% of the oil and gas production from the North Sea. On 6 July 1988, an explosion and fire destroyed it, killing 167 men. It was the world's worst offshore oil disaster. The accident was caused by a mixture of bad design, bad management systems, and human error. Safety management has improved a lot as a result of lessons learned from Piper Alpha.

**Language spot**

**First conditional**

1. Look at sentence a and answer questions 1 and 2.
   
   a. *If a company drills a dry hole / it will lose money.*
   
   1. Does ‘if’ introduce a condition or a result?
   2. Which tense does it use in each part of the sentence?

2. Look at sentence b. What is the negative of ‘will’?
   
   b. *If you set an unfair target, people won't try to reach it.*

3. Make sentences in the first conditional from the prompts.
   
   1. You can’t go out like that. They ________ (not let you) on the platform if you ________ (not wear) a safety hat.
   2. If the results ________ (be) good, we ________ (start drilling) in the spring.
   3. If ________ (you accept) the job, you ________ (have to) do a week’s safety training.
   4. If we ________ (not find) oil this time, we ________ (lose) lots of money.
   5. We ________ (not fly) to the platform if the weather ________ (get) worse.

>> Go to Grammar reference p.121

**It’s my job**

1. Read the note about the Piper Alpha disaster. What caused it?

2. David Kapoor is a safety engineer in a design company. Read the text and answer the questions.
   
   1. How did David become a safety engineer?
   2. What happens between the Design Safety Case and the Production Safety Case?
   3. Why has the Piper Alpha disaster been important for safety?
   4. What was his job in Korea?
   5. What does he feel about safety in the UK?

3. Read the second paragraph again and whether the topic belongs to the Design Safety Case (DSC) or the Production Safety Case (PSC). Tick (✓) the boxes.

<table>
<thead>
<tr>
<th>Topic</th>
<th>DSC</th>
<th>PSC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identification of major hazards</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ALARP risks</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maintenance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Escape routes and lifeboats</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**David Kapoor**

I work in the Safety and Environmental Section for a design company on the design of oil and gas platforms. I left university with a degree in chemical engineering; later on I did several industry safety training courses.

My main job is preparing the Design Safety Case. This paper describes the main features of the installation and identifies the hazards that could cause a major accident. It also includes lifeboats, escape routes, safety equipment, and shows how any remaining risks to safety and health are ALARP. The paper goes to the Health and Safety Executive panel where it is examined. If the panel gives its approval, we can move on to the next step. This is producing the Production Safety Case, which adds more information about operations and maintenance and the Operator’s safety management systems. The regulations were introduced after the Piper Alpha disaster in 1988.

I am also asked to carry out safety risk assessments on projects during construction. My last trip was to Korea where I made a tour of the construction site to assess any risks to the designer’s construction support team. The statistics for health and safety in the UK are very good but there are still deaths, serious injuries, and lost time accidents that we can stop from happening.

We have to maintain and improve our management system rather than blame individuals.
Project

Work in groups. Each person should take one of the topics. When you are ready, report back to the rest of your group.

1. Which places in the world have the best/worst accident records?
2. Find out where it is more dangerous to work—offshore or onshore.
3. What are the dangers associated with flying to offshore platforms? How can personnel be prepared to reduce the risks as much as possible?
4. Find out what caused the Alpha Piper disaster.

Reading

One day in Texas

Read about the Texas refinery disaster. Write T (true) or F (false).

1. The splitter was operating for a long time.
2. There was a warning on the instrument panel.
3. An alarm wasn’t working.
4. An operator opened the valves.
5. The blow-down drum was supposed to deal with excess liquid.
6. The gas and liquid escaped through a broken pipe.
7. There was a flare system to burn off gas.
8. It was OK for the vehicle to be in the area.

The BP Texas City refinery accident

Accidents don’t happen very often, but when they do, they can have terrible results. On 23 March 2005, an explosion at BP’s Texas City Refinery killed fifteen workers and injured more than 170 others.

A splitter that separates light and heavy gasoline was started up after a two-week shutdown. Operators didn’t follow orders on the instrument panel. As a result, the splitter filled up with too much liquid that then became too hot. Someone had turned off the alarm that warned about over-filling. So much pressure built up in the production tower that three valves opened automatically. Liquid flowed into the blow-down drum: a container that was supposed to deal with this. Unfortunately there was too much fuel in the drum so that liquid and vapour went up the 113-foot vent into the open air. Although experts had recommended a flare system to burn off dangerous gas, BP said it didn’t need one. So the mixture of gas and liquid fell to the ground. There, a spark from a vehicle set off an enormous explosion. The vehicle should not have been in the area.

The explosion blew up a large part of the area and could be heard many miles away. Eleven of the people who were killed were having a meeting in a trailer in the danger zone. The trailer should have been further away. Other victims were carrying out maintenance work nearby. An enquiry into the accident indicated the basic causes were equipment failure, risk management, staff management, and working culture.
Writing

Risk assessment report

Harry King has toured his site to identify possible hazards. Read the first two rows of his report and answer the questions.

1 Which hazard is concerned with how people behave?
2 Which hazard is concerned with the structure and design of the site?
3 Which one does Harry think is riskier / more likely to happen?
4 Which one does he think is more likely to harm someone badly?

How does Harry express these comments in his report?

1 Some personnel aren't wearing hard hats
2 There are regulations in place
3 We need to discuss this with the D4 area supervisor
4 We need to measure lighting and install portable lights until permanent ones are installed

3 Use these comments to complete the third part of the report.

'We need to tidy up the area. It is important to enforce the regulations.'
'There are already regulations about consuming food and drink on site.'
'It's not much of a risk.'

Imagine that you are inspecting your place of work or study. Write a report in the form of a table. Follow these steps.

- Identify the hazard.
- Say who is affected.
- Describe the existing measures.
- Judge the risk (H, M, L).
- Assess the degree of harm (H, M, L).
- Decide what should happen to reduce or eliminate the risk.

---

Risk assessment
Assessment by: HK

<table>
<thead>
<tr>
<th>Hazard</th>
<th>Who is affected</th>
<th>Existing measures</th>
<th>Probability of harm (H, M, L)</th>
<th>Degree of harm (H, M, L)</th>
<th>Preventative action</th>
<th>Person responsible</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Some personnel not wearing hard hats</td>
<td>Site personnel, Area D4</td>
<td>Regulations in place, notices on board</td>
<td>M</td>
<td>H</td>
<td>Discuss with D4 Area Supervisor, consider additional training</td>
</tr>
<tr>
<td>2</td>
<td>Lighting level poor on stair well D5/C5</td>
<td>All</td>
<td>Portable lights fixed to scaffolding</td>
<td>L</td>
<td>M</td>
<td>Measure lighting levels. Install portable lights until permanent lights installed</td>
</tr>
<tr>
<td>3</td>
<td>Untidy control room. Cups, paper. Could cause slipping. Fire hazard</td>
<td>Electrical and instrument technicians</td>
<td></td>
<td></td>
<td></td>
<td>Supervisors</td>
</tr>
</tbody>
</table>

H = high, M = medium, L = low

Task/Job card No: General Site Tour
Date: 20th August 20—
Language spot

**should have done**

1. Study the example from *Reading* and answer questions 1–4.
   *The trailer should have been further away.*
   1. Was the trailer far enough away from the danger zone?
   2. Was it a good idea to be further away?
   3. Does the sentence describe a real or unreal situation?
   4. Does the sentence talk about a situation in the past, present, or future?

2. Make sentences using *should / should (not) + have + past participle.*
   1. The operators should / follow the instructions on the instrument panel.
   2. The system / should / not use a blow-down drum.
   3. BP should / fit a flare system.
   4. Someone should not / turn off alarm.
   5. Refinery managers / should / not allow vehicle into the danger zone.

3. Whose fault was the accident in *Reading*? Put a–f in order from the most to the least responsible.
   a. the designers of the tower and blow-down system
   b. management at the refinery
   c. the operators in charge of the start-up
   d. BP’s management systems
   e. the driver of the vehicle
   f. the person who had turned off the alarm

**Go to Grammar reference p.121**
14 Industry future

**Kick off**

1. What issues will influence the future of the oil and gas industry? Make a list. Look at the photos for some ideas.

2. Work in small groups and compare your answers. Discuss why.

---

**Language spot**

Predicting the future

1. Read about Sam talking about his future. Is he sure or not sure about these things? Write S (sure) or N (not sure).

   1. Course in deep-sea diving
   2. Job as a deep-sea diver
   3. Get a job in a restaurant or shop
   4. Live with his brother
   5. Get a flat with his friend
   6. Look for a job on an oil platform
   7. Get a job as a roustabout
   8. Roustabout isn't an easy job

---

When I finish college, I’m doing a course in deep-sea diving. That will be really exciting. I could get a job as a deep-sea diver with an oil company in the future. I’m not sure what I want to do after that, but I’ll have to make some money. I think I’ll get a job in a restaurant or shop for a few weeks. I also need somewhere to live. I could live with my brother or I might get a flat with my friend. I’m not sure. I’d like to work offshore, so I think I’ll look for a job on an oil platform. I could try to get a job as a roustabout but it won’t be an easy job.

---

2. Choose the correct verb.

   1. Yuri is doing / may do a safety course next week. He’s not sure.
   2. He wanted to leave at five o’clock, but he has to finish the report first. He could / will be late.
   3. I’m flying to Lagos tomorrow. I’m meeting / might meet the project manager to discuss the time schedule.
   4. I might try / am trying to get a job in a refinery or I am looking / could look for a job in the plastics industry. I can’t decide.
   5. He might not / won’t get the job! He doesn’t have the right qualifications.
   6. They will / could find oil in the north of the country. The geologists are doing tests there now.

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Go to Grammar reference p.121

<table>
<thead>
<tr>
<th>Br E</th>
<th>Am E</th>
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</thead>
<tbody>
<tr>
<td>flat</td>
<td>apartment</td>
</tr>
<tr>
<td>finish college</td>
<td>graduate</td>
</tr>
</tbody>
</table>
3 Answer the questions with the ideas in brackets.
   
   **EXAMPLE**
   Will the company find new oilfields? (in the north, offshore)
   I’m not sure. They might find new oilfields in the north or they could find new oilfields offshore.

   1 When are you taking the exam? (next month, next year)
   2 Where are the geologists working next month? (in Algeria, near Greenland)
   3 How will we make electricity in the future? (from water, from the sun)
   4 What kind of job will you look for? (in exploration, in refining)
   5 How long will the project last? (six months, a year)

   In pairs, practise asking and answering the questions above.

### Listening

#### Renewable energy

1 Look at the pictures. How can we make electricity?

### Speaking

#### Talking about the future

1 Work in small groups to discuss these statements about the future. Explain why you agree, disagree, or are not sure.

   1. There won’t be any more oil and gas in my country in 50 years.
   2. Oil and gas will become very expensive in the future.
   3. Engineers will develop new technology for extracting oil and gas.
   4. My country will be the biggest oil-producing country in the world in twenty years.
   5. We will make all our energy from wind, sun, and water instead of oil and gas.
   6. There will be more jobs in oil and gas in my country in the next ten years.
   7. My country will earn less money from oil and gas in ten years.
   8. We will process more oil from oil sands.
   9. Cars will use solar energy.
   10. We will use oil from plants to make fuel for aircraft.

2 Find out what optimistic and pessimistic mean. Are you optimistic or pessimistic about the future of the oil and gas industry in your country? Why?
In 2000, BP, the world’s third largest global energy company, launched an advertising campaign to improve their image as a green company. They changed their logo from BP to bp and added Beyond Petroleum.

What do you think BP wants to tell people with Beyond Petroleum?
How important is a brand name for a company?
Can a new brand name change the way the public see a company?

Reading

Cars of the future

1 Work in pairs and discuss the questions.
   - Do most people in your country have a car?
   - What kind of fuel do their cars use?
   - How economical are they?
   - How much pollution do they cause?
   - What will cars be like in the future?
   - What renewable sources of energy will cars use in the future? Look at the pictures for ideas.

2 Read the text. Match the headings with the paragraphs.
   1 An alternative fuel for vehicles
   2 The benefits of hydrogen from oil
   3 The problems with oil
   4 Sources of hydrogen

3 Answer the questions.
   Paragraph A What are the two problems with oil-based fuel?
   Paragraph B What is the alternative fuel?
   Paragraph C Which process is used to separate the molecules in natural gas? What is the problem with this process?
   Paragraph D What does a fuel cell do? Why do most fuel-cell-powered vehicles use petrol at the moment?

4 Work in pairs and discuss.
   - Are fuel-cell-powered vehicles used in your country today?
   - Are there any hydrogen filling stations?
   - Do you think hydrogen will be the fuel of the future?
   - What must happen before more people begin to use hydrogen?

Using hydrogen as a fuel

A At the moment, most of the energy we need for transportation comes from oil. One problem is that in the future, there may not be enough oil. Another problem is that vehicles cause pollution, particularly in cities. When the car engine burns fuel, it produces poisonous greenhouse gases.

B Scientists are working hard to find an alternative. Over the next twenty to thirty years we will use less fossil fuel and more renewable energy. Our cars will probably use stored energy from batteries and many scientists are working to develop cars that will run on hydrogen.

C Hydrogen will never run out, but it doesn’t occur by itself naturally. It exists together with other elements in water, fossil fuels, and all plants and animals. To get hydrogen, it has to be separated from other elements, using, for example, water or natural gas. Natural gas is made up of carbon and hydrogen molecules. The process of steam reforming can be used to separate these molecules. Unfortunately, the steam reforming process also produces carbon dioxide – a greenhouse gas.

D Cars that use hydrogen can use a fuel cell. Fuel cells use hydrogen and take oxygen from the air to produce electricity. The process also produces water and waste heat which don’t damage the environment. It’s difficult to transport, distribute, and store hydrogen so there are very few hydrogen stations where car drivers can buy hydrogen at the moment. As a result, most fuel-cell-powered vehicles being developed use a reformer to get hydrogen from gasoline. Compared to gasoline or diesel engines, gasoline-powered fuel-cell vehicles could be twice as efficient and reduce air pollution in cities. Some people believe they are an excellent step in making vehicles cleaner and more efficient but they still need more development.
Project

Scientists believe that carbon dioxide \((CO_2)\) in the atmosphere above the earth is causing global warming. Carbon Capture and Sequestration (storage), CCS, is one way to reduce the amount of carbon dioxide that is released into the atmosphere.

Use your library and your internet skills to find out about CCS. Make notes under the following headings.

- What is CCS?
- Reasons to store \(CO_2\)
- Places to store \(CO_2\)
- Possible uses of \(CO_2\)

The following website may be helpful.
www.ccs-education.net

It's my job

1. Look at this family of words.
   analyse (v)   analysis (n)   analytical (adj)

   Each word is pronounced differently. The stress is underlined. Practise saying these words.

   Put each word in the correct sentence.
   1. People who try to understand a problem by looking at every part have an _______ way of working.
   2. In my job I look very carefully at different systems and then _______. them to try to understand them.
   3. I have to look carefully at each part and do an _______ of it.

2. What do you think an analyst is?

3. You are going to read about Oraz Naiman, who works as an oil and gas analyst. First, check you know the meaning of these words. Which words have a clear connection with oil and gas?
   research   confident  Modelling exhibitions
   interpreting advice   expertise   value
   database translating opportunity

4. Now read the text and answer the questions.
   1. What did Oraz study at university?
   2. Why did he get the opportunity to work in Russia?
   3. Give one example of what he does today.
   4. What is financial modelling?
   5. Why does he like teamwork?
   6. Why does he want to go back to university?

5. Do you speak more than one language well? What are the advantages of speaking more than one language?

Oraz Naiman

The company I work for does research for and gives advice to the energy industry. I got a job with them after I finished my course in Business Studies at university. I didn't have any industry knowledge or experience but I wanted to learn and I was very interested in different cultures. I am from Kazakhstan, but my mother is from Russia. I speak Kazakh, English, and Russian.

At first I worked with new, smaller companies in the upstream business. Then, my company gave me the opportunity to use my knowledge of Russian language and culture. At first, I helped by interpreting and translating English and Russian. At the same time I started to develop contacts in Russian companies and government agencies. I also went to exhibitions. I learned to use and update company databases. Slowly, I got more responsibility.

Today I analyse company accounts and write reports. I use computer programs to do financial modelling. That means looking at what will happen if the company decides to do different things. I also look at different companies and compare them and work out the value of oil and gas reserves. I work a lot on my own but I also have to work as part of a team. I enjoy team work because team members have different knowledge and experience. We can do more by working together.

There have been very big changes in politics and economics in Russia so now there are more jobs in Russia. I now travel a lot in the Russian Federation and Europe. I am building my knowledge and experience and I now feel more confident.

I want to do another course at university to increase my expertise and then I'd like to start my own business one day.
Today we live in a project world, and if you’re in a project world, you’ve got to be a great teammate.

Tom Peters, American writer on business management practices

In the past, some of the greatest engineers worked on their own and not in a team. Why do you think that today we live in a project world?

Vocabulary

Compound nouns / adjectives

We can make compound nouns from two nouns, or from an adjective and a noun.

natural gas

Compound nouns are usually written as two words.

EXAMPLE

filling station.

1 Choose a word from A and a word from B to form a compound noun to complete the sentences.

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>fuel</td>
<td>station</td>
</tr>
<tr>
<td>fossil</td>
<td>cells</td>
</tr>
<tr>
<td>filling</td>
<td>warming</td>
</tr>
<tr>
<td>oil</td>
<td>energy</td>
</tr>
<tr>
<td>global</td>
<td>fuels</td>
</tr>
<tr>
<td>renewable</td>
<td>field</td>
</tr>
</tbody>
</table>

1 Oil and gas are examples of ____________.

2 The Agbami _________ lies about 110 km from the Nigerian coast and the reserve is about one billion barrels.

3 Car drivers can buy petrol / gasoline or diesel at a ____________.

4 If oil and gas run out, we will have to find ____________.

5 When we burn oil and gas, we produce carbon dioxide that leads to ____________.

6 _________ use hydrogen and oxygen from the air to produce electricity.

2 Compound adjectives are often written with a hyphen.

EXAMPLE

oil-based fuels fuels which are based on oil

Explain these compound adjectives in the same way.

1 fuel-cell-powered vehicle

2 deep-sea diver

3 double-hulled tanker

4 20-kilometre pipeline

5 well-head pressure

Professional skills

Working in a team

1 Do you sometimes have to work in a team? What makes a good team? What are the problems that teams sometimes have?

2 Work in pairs and look at the list of points that tell us what a good team member should do. Decide which are the five most important and be prepared to explain your reasons.

Good team members should

- be clear about their role
- agree on the goals of the project
- agree on ways to do things
- trust each other
- develop a good relationship with others on the team
- communicate with anyone they have a problem with
- not blame others
- ask for information when they’re not sure
- support teammates by listening to their ideas
- not shout about personal success
- take time to help teammates.

3 Join another pair in the class. Tell them your five most important points and explain why you have chosen them. Now work together to agree the five most important points.

4 Do you find it easy to work with others on a team? Why / why not?
Writing

Sending a covering letter

Oraz has been working for an oil company. They asked him to do an analysis. He is now sending them his analysis report by email. He sends a covering letter with his report.

1 Read the email and answer the questions.
   1 What did Stepan ask him to analyse?
   2 What does he think is the best solution?
   3 What does he want Stepan to do next?
   4 Why must it happen soon?

2 Decide where the following phrases go in the email.
   The next task
   You asked me
   completed the analysis
   As you will see
   arrange a meeting
   I am attaching

3 Write a similar email. Use these notes.

   Report route of the pipeline from AB178 to Seatown
   Analysis routes X, Y, and Z
   Results best route X
   Next task put together a project group
   Ask for meeting to discuss analysis before holiday

---

Re: Oil transportation from AB178 to Seatown
From: Oraz Naiman [onaiman@idss.co.uk]
To: Stepan Cherevin
Attachment: Oil transportation analysis AB178.doc (3215KB)

Dear Stepan

I have now __________ 1 for the transportation of oil from well AB178 to Seatown. __________ 2 to consider whether a pipeline was the best method of transporting the oil to the coast.

__________ 3 the analysis with this email. __________ 4, I have studied the possibilities of using a pipeline, road transportation, and rail transportation. My calculations suggest that the pipeline is the most feasible. __________ 5 is to decide on the route for the pipeline.

I would be grateful if we could __________ 6 for a discussion of the report. I am off to Kazakhstan next month for three months, so, if possible, I'd like to meet before then.

Best wishes

Oraz

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Checklist

Assess your progress in this unit. Tick (✓) the statements which are true.

- I can talk about future possibilities
- I can understand a conversation about renewable energy
- I can understand a text about new car technology
- I know what is important for teamwork
- I can write a covering letter / email

---

Key words

Adjectives
deepea
poisonous
renewable

Nouns
expertise
fuel cell
global warming
greenhouse gas
roustabout
source

Verbs
extract
interpret
run out
separate
translate
work out

Look back through this unit. Find five more words or expressions that you think are useful.
15 Careers in oil and gas

Kick off

1 Look at the pictures. What sort of jobs do you think these people have?
2 Read about these people. How many work mainly outdoors and how many work indoors?

1 Lars – Production Engineer: I work with everything to do with the well – design, construction, operation, maintenance, quality. I mainly manage projects from the office and sometimes visit drilling sites.
2 Paul – Derrickhand: I check mud that is used in drilling every four hours and send the data to the engineers. I am also responsible for the mud pumps.
3 Aleksey – Driller: I work on a drilling rig. It’s hard work moving and maintaining heavy equipment.
4 Hausa – Chef: I work on a large oil rig in the North Sea. It’s my job to prepare food for the 140 workers who work on the rig.
5 Karl – Production Field Administrator: It’s my job to enter data into computer programs and do other office jobs when necessary.
6 Miguel – Plant Manager: I’m the manager of a factory that makes storage tanks and piping for oil and gas companies. I spend most of my days discussing projects, design, safety, etc. with people in the company.
7 Bo – Field Engineer: In my job we use wireline to collect data from a well while it is being drilled. I work with two other people and drive long distances each week.
8 Ulf – Remote Operated Vehicle Pilot: We use an ROV to check structures and conditions under the water. It’s my job to operate this vehicle from the platform using electronic equipment.

3 Choose a job that you would like to do and choose a job you would not like to do. Work in small groups and explain your choices to the others.

Vocabulary

People and jobs

The job titles of people who do certain jobs often end in -ist, -er, -or, or -ian.

EXAMPLES
a person who works in technology = technologist
a person who manages = manager

1 Write the job titles of the people who do the following.
1 a person who welds metal pieces together
2 a person who works with electrical equipment
3 a person who supervises work

4 a person who drills
5 a person who works with technical things
6 a person who operates machinery
7 a person who plans how to do something
8 a person who has studied geology
9 a person who surveys the land
10 a person who has studied science

2 Find the job titles of at least five other people with these endings.
Reading
Jobs in oil and gas

1 Read the title of the text. What does it mean? What sorts of opportunities are available in the oil and gas industry? Discuss in pairs.

Example
There is an opportunity to earn a good salary.

2 Scan the text to find the names of four different categories of jobs in the oil and gas industry and write them in column A in the table.

3 Read the text in more detail and put a tick (✓) for yes or a cross (✗) for no in the boxes in the table.

<table>
<thead>
<tr>
<th></th>
<th>Office job</th>
<th>College education</th>
<th>University education</th>
<th>Opportunity to travel</th>
<th>Overtime</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
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<td>3</td>
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<td>5</td>
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<tr>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4 Complete the following sentences with one of the words in bold in the text.

1 I’ve been working as a technologist, but now I’ve finished my course at university and I hope to get _________ soon.
2 We have to work 38 hours a week, but if we work longer we get paid _________.
3 Workers usually get paid _________ but professional people get paid a _________.
4 He doesn’t work outside. He’s got an _________.
5 You must do a health and safety course and get a _________ before you can work in this area.
6 It takes three or four years of university to get a _________.

Project
Find one example of each type of job in the oil and gas industry from Reading. Make notes under these headings.

- Education
- What you do at work
- Money
- Career opportunities

You may find the following websites useful.
www.careersinoilandgas.com
www.oilrecruiter.net

A WORLD OF OPPORTUNITIES

There are many different jobs within the oil and gas industry, each requiring different skills and qualifications and sometimes travel.

Working as a labourer is physically hard. You have to be strong and willing to work very hard. You work outdoors on site, perhaps for a driller or pipeline company. You only need qualifications from school and, of course, health and safety qualifications.

You get the chance to travel and often get paid overtime so you can earn good wages.

An apprentice begins work after leaving school, working together with a qualified person such as a technician, electrician, or welder to learn the job. At the same time, an apprentice spends time at college to get a recognized certificate or diploma. It can take three or four years but there is the chance to travel and get paid for overtime too.

Technologists usually study at college for two or three years and have a qualification before they begin work in specialized fields. Their job is to decide which equipment to use on site, how to install it, and use it. Some technologists have an office job, but some work in the field and have to travel.

Engineers have a university degree and are often expected to do more study while working. They earn a good salary but have a lot of responsibility and have to know and follow regulations. There are usually good chances of promotion and many engineers work their way up to jobs as managers. Engineers work in the office and also travel to work sites.

Of course not all the jobs in oil and gas are technical jobs. There are many people who work in transportation, health and safety, or customer relations. There are also people who have to negotiate with land owners and draw up contracts. It’s an amazing industry! There are millions of people working in almost every country in the world so there are lots of opportunities.
Labourers working on an oil rig earn between $50,000 and $80,000 per annum (each year). Professional people can expect to earn from $70,000 up to $220,000 per annum. In addition, all employees on an oil rig get good food and the accommodation is similar to a hotel. Why are the standards of food and accommodation so high on an oil rig? Do you think employees are paid a good salary? Why / why not?

### Listening

#### Into the future

1. Harper, Walid, Patrick, and Scott are at technical college together. They are discussing their plans for when they finish their course. Listen to the conversation and answer the questions.
   1. How many have already found a job?
   2. How many are still looking?

2. Listen again and write T (true) or F (false).
   1. The course lasts for another three months.
   2. Walid has got a job with the National Oil Company.
   3. Harper wants to travel.
   4. An oil company representative is coming to the college.
   5. Harper has arranged to speak to someone.
   6. Scott doesn’t want to do any more studies.
   7. Patrick has found a job offshore.
   8. Patrick replied to an advertisement in a newspaper.

### Language spot

#### Talking about the future

1. There are many different ways of talking about the future. The way we choose depends on how we think about the future event. Match the ideas 1–5 with the language a–e.
   1. There aren’t that many good jobs at the moment so ...
   2. I’ve already agreed to work for them ...
   3. Courses always end at this time of the year ...
   4. A person has arranged to come and see us ...
   5. I’m making a decision as I speak ...
   a. I think I’ll go along too.
   b. Ours finishes next month.
   c. I’m going to start working for them next month.
   d. It’s going to be hard to find a well-paid one.
   e. Someone is visiting the college next week.

2. Which sentence(s) in 1 use(s)
   - going to?
   - will?
   - the Present Continuous + a time marker?
   - the Present Simple?

3. Complete the sentences with the most suitable way of talking about the future. Remember that more than one answer is possible, but be prepared to justify your choice.
   1. We _________ (fly) to the platform after lunch.
   2. I have made plans, I _________ (work) for two years and then _________ (do) a Master’s degree.
   3. The second year field trip _________ (happen) in the last term.
   4. I’m not sure which options to take, I think _________ (do) advanced drilling techniques and FPSO management.
   5. I’m doing a lot of revision because we _________ (have) a test on Tuesday.
   6. This summer I _________ (visit) my uncle in Jordan.

>> Go to Grammar reference p.122

### It’s my job

1. In Unit 4 you learned about exploration. What is exploration? What is an explorationist? Read what Andy says about his job. Answer the questions.
   1. Has Andy always had the same job?
   2. What did Andy do in his gap year?
   3. What do you think a gap year is?
   4. What does Andy like about his job?
   5. What languages does Andy speak?
   6. Why do you think it is useful to speak two languages?
   7. Does Andy think that it’s good to work in the oil and gas industry? Why?
   8. What are the disadvantages with his job?


3. Discuss the questions in pairs.
   - Is a gap year a good idea? Why / why not?
   - When is the best time to take it – after school and before university or after university and before you start a career? Why?
   - Do young people in your country take a gap year?
   - Would a gap year be a good idea for you? Why / why not?
At university I studied covering letter CV referee
I majored in ... cover letter résumé reference

**Andy Dupont**

I started work for a Scottish oil and gas company as a technical assistant. That was two years ago. Then I was promoted to junior explorationist. My company spends a lot of time searching for oil and gas. My job is to analyse data that we collect from seismic studies and I now have to manage my own projects.

At university, I studied geology and physical geography. After I graduated I had a gap year. I have always enjoyed travelling so I spent the year travelling around the world. It was a great experience. I learned a lot about different cultures and about myself too.

I love my job because there is a wide variety of different tasks. I travel to the places where we are carrying out seismic surveys. I have to organize tests and collect and analyse data. I speak English and French equally well and that can be very helpful. I've already been to some of the hottest and coldest parts of the world. Working in extreme conditions onshore sites can be tough. We spend long days in our truck in the heat or cold in places where very few people live. In the office I analyse the data we have collected so we can build a subsurface map. I have a lot of responsibility. It's really exciting when my manager makes the decision to drill.

Jobs in the oil and gas industry are well-paid. I get a good salary. I also have the opportunity to do further study as well as travel. I'd definitely recommend the job to others but it's not the easiest job for people with a family. I'm often away from home for long periods of time and I may have to live abroad in the future.

**Vocabulary**

**Finding jobs**

Read the sentences and match the words in bold with definitions 1–15.

- She went for three interviews before they gave her the job.
- I'm trying to find a placement or internship for the summer to get some experience.
- You don't need lots of qualifications but you have to be tough and ready to work hard.
- I think I'm going to apply for a postgraduate course if there are still vacancies.
- Just send me a CV, don't worry about a covering letter.
- There's an application form on our website you can fill in.
- The company recruits and trains over a hundred school-leavers each year.
- I'd like the names of two referees as well.
- More than ninety candidates replied to the advertisement.

1. the letter you send with a CV that says why you want the job
2. to add information to the gaps on a form
3. the practical knowledge and know-how you get from doing something
4. an official document that shows you have reached a required level
5. a person who wants to be considered for a job
6. a meeting where you are asked questions to see if you are suitable for a job
7. a list of printed questions that you answer by filling the gaps
8. (Br E) a job that is often a part of studies where you get experience of a particular kind of work. Usually unpaid
9. (Am E) a job that is often a part of studies where you get experience of a particular kind of work. Usually unpaid
10. someone who knows you well who gives their opinion of you
11. an available job
12. to teach someone how to do a specific task
13. to get someone to join a business or organization
14. a document that gives details about your education and qualifications and the jobs you have done
15. to formally request a job
A CV gives an employer a summary of your education and experience. Correct grammar, correct spelling, and neatness are very important. It's also important to keep your CV short. Remember that a clear, well-organized CV won't guarantee that you get the job, but a poorly written one usually means you won't.

**Speaking**

**Talking about your future**

1. It is not always easy to find a work placement or internship. Have you had any experience of this or do you know someone who has?

2. Jerry Henderson is telephoning Mr Rashid of OES, an oil exploration organization. Mr Rashid is in charge of placements. Listen and answer the questions.
   1. What is Jerry studying, and where?
   2. What is he trying to find?
   3. What experience does he have?
   4. What is Jerry's ambition?
   5. How does Jerry have to apply for a placement?
   6. Does Mr Rashid offer him a job or an interview?

3. Put these interview questions in the correct order.
   1. something / could / tell / you / yourself / about / me
   2. you / got / of / experience / exploration / have / any?
   3. do / longer / the / see / doing / what / yourself / you / term in?
   4. you / prefer / work / in / would / office / to / in / the / or / an / field?


   Well, my name's Jerry Henderson. I'm twenty years old and I'm ________ my second year ________ a geology degree ________ Nottingham University. I am looking for a placement ________ an exploration company ________ this summer.

5. Expand the prompts to Jerry's ambitions and preferences.
   1. Well, my ambition / be / work / exploration company like yours, perhaps / wireline logger, / seismic engineer. But first I / like / get / first-hand experience / these jobs.
   2. I / rather work / field.

6. Write about your own long-term ambitions and immediate plans.

7. Work in pairs and take turns to ask and answer the questions in 3.

**Writing**

**A CV and a letter of application**

1. Jerry has sent his CV and a covering email to Mr Rashid. Complete the letter of application with words and expressions from the list.

   As I told you
   Dear
   if you need them
   I look forward
   I would now like
   Please find attached
   Thank you very much
   Yours sincerely

   Object: Work experience placement summer 20——
   ________ Mr Rashid
   ________ for talking to me earlier. ________ I am looking
   ________ in this field I thought I would apply to you.
   ________ the theory of different research methods.
   ________ to gain valuable
   ________ first-hand practical experience of exploration
   ________ I am an open and friendly person who is willing to
   ________ I work well in a team. I recognize the importance
   ________ and am
   ________ an up-to-date CV for your consideration. I am happy to
   ________ to hearing from you,

   Jerry Henderson

2. Now look at Jerry's CV and match the missing headings with the text.
   1. Objective
   2. Date of birth
   3. References
   4. Work experience
   5. Interests
   6. Education and qualifications

3. Write your CV and a covering letter for a work placement using Jerry's CV and covering letter as models.
CV  Jerry Henderson

Name: Gerald Paul Henderson

21 December 19—

Home address: 92 Green Road, Rickwood, Herts, WD3 6RF
Telephone: 01924 786512 mobile: 07819 876386 e-mail: j_phenderson24@superserve

To find a placement in a petroleum exploration company that will help me gain and develop my practical skills.

19— 19— Netherwood Sixth Form College
A levels: Maths A; Physics A; Chemistry B; Geology A
20— 20— University of Nottingham. Currently in the second year of a three-year degree programme.

Skills:
Clean driving licence.
Good computer skills. 3D computer modelling packages.

July—August 20—: Warehouseman


I can supply the names of two people on request.

---

Checklist

Assess your progress in this unit. Tick (✓) the statements which are true.

- I know a little about career opportunities in the oil and gas industry
- I understand different ways of talking about the future
- I can apply to a company
- I can write a CV and covering letter

---

Key words

Nouns
ambition
apprentice
contract
experience
internship / placement
opportunity
qualification
reference
reputation
responsibility
skill

Verbs
apply
draw up
negotiate
promote

Look back through this unit. Find five more words or expressions that you think are useful.

---

<table>
<thead>
<tr>
<th>Br E</th>
<th>Am E</th>
</tr>
</thead>
<tbody>
<tr>
<td>clean driving licence</td>
<td>clean driving record</td>
</tr>
<tr>
<td>driving licence</td>
<td>driver's license</td>
</tr>
<tr>
<td>mobile phone</td>
<td>cell phone</td>
</tr>
</tbody>
</table>
Unit 2 p.14
Checking understanding

Student A

Look at your notes. Ask and answer questions to complete your table with information about the other field. Look at the examples.

**EXAMPLES**

**What is the name of the oilfield?** ACG oilfield

**Can you spell that, please?** A-C-G.

**Where is Kazakhstan?** It's on the west coast of the Caspian Sea.

**Did you say Caspian?** No! Caspian.

**C-A-S-P-I-A-N.**

**How much oil is there?** 5.4 billion barrels.

**Could you repeat that, please?** 5.4 billion barrels.

<table>
<thead>
<tr>
<th>Name of the oil field</th>
<th>ACG oil field</th>
</tr>
</thead>
<tbody>
<tr>
<td>Country</td>
<td>Azerbaijan</td>
</tr>
<tr>
<td>Where the country is</td>
<td>West coast of Caspian sea</td>
</tr>
<tr>
<td>Start of production</td>
<td>1997</td>
</tr>
<tr>
<td>How much oil</td>
<td>5.4 billion barrels</td>
</tr>
<tr>
<td>Which oil companies</td>
<td>Consortium of companies – main company is BP</td>
</tr>
<tr>
<td>Oilfield location</td>
<td>120 km offshore in 120 m of water</td>
</tr>
<tr>
<td>Oil transport</td>
<td>Crude oil brought ashore through pipeline to Sangachal terminal south of Baku and then by pipeline to Novorossiysk</td>
</tr>
</tbody>
</table>

Unit 12 p.86
Organizing an exhibition

Student A

You are running the meeting about the exhibition.

1. Find out about the progress for the following.
   - oil companies coming
   - VIPs from the oil ministry
   - how many spaces have been taken for the stands.
   - Ask what price is fair for the three-day exhibition. (set a deadline)

2. Ask about the food and drink and security. (chase up)

3. Find out about the key speaker – you want Dr Abdulla Al-Qatari of the National Oil Company to speak.

Unit 10 p.74
Problem solving

Student A

You are a maintenance technician on a pipeline. You have done some tests on the pipeline. They show the build-up of wax.

There is a high paraffin content in the oil it transports.

There is a problem 203 miles down the pipeline where it is on a bend.

The pipeline needs to be cleaned as it slows the flow and can damage the pipe.

At the moment a pipeline inspection gauge has to travel all the way down the line. This takes time.

You think that there needs to be another station halfway down the pipeline where cleaning gauges can be sent.

You would like to close the line down.
Unit 3 p.18
Exchanging information

Student A
You have some information about the chemical composition of crude oil. Enter your information in the table, then answer your partner’s questions. Ask questions with How much to complete the column about natural gas.

Example
How much carbon is there in natural gas?
In crude oil, there is approximately
84–87% carbon
11–14% hydrogen
0.06–2% sulphur. Sweet crude oil <0.5% sulphur by weight (more valuable). Sour crude oil >0.5% (can be a problem)
0.1–2% nitrogen
0.1–2% oxygen

<table>
<thead>
<tr>
<th>Crude oil</th>
<th>Natural gas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon</td>
<td></td>
</tr>
<tr>
<td>Hydrogen</td>
<td></td>
</tr>
<tr>
<td>Sulphur</td>
<td>sweet</td>
</tr>
<tr>
<td></td>
<td>sour</td>
</tr>
<tr>
<td>Nitrogen</td>
<td></td>
</tr>
<tr>
<td>Oxygen</td>
<td></td>
</tr>
</tbody>
</table>

Unit 5 p.31
Options and suggestions

Student A
You are in charge of the meeting. Follow the instructions below.

1. Introduce the topic of the meeting:
   You want to discuss the best way of exploiting a reservoir that is under a mountain range.

2. Ask student B for his / her opinion.

3. Ask student C for his / her opinion.

4. Give your opinion. You think a long deviated well will be long and technically difficult. You are not exactly sure of the type of rock you will meet. You think the subsurface may be broken.

5. Conclude the meeting by saying that you want to
   (i) talk to the exploration team again – is the subsurface fractured (broken up)? Ask B to arrange the meeting.
   (ii) compare the cost between a long deviated well under the mountain, and a vertical well in a valley with a pipeline. Ask C to compare the costs.

6. Thank everyone for coming.

Unit 9 p.65
Using visuals in a presentation

Student A
There are three types of pipelines. Upstream, oil and gas from the fields is carried in gathering pipelines. There are many gathering pipelines and they are usually smaller and shorter. These gathering pipelines connect into transportation pipelines. There are usually a few long and large transportation pipelines. For example, the trans-Siberian is a transportation pipeline. Downstream there are many smaller and shorter distribution pipelines. These distribution pipelines transport the oil or gas from the transportation pipeline to tanks, storage facilities, and end users.
Unit 7 p.44
Sharing information

Student A

<table>
<thead>
<tr>
<th>Location</th>
<th>Sakhalin island is on the ________ coast of Russia. There are oilfields on the east coast of the island, including Chayvo, Odoptu, and Arkutun Dagi.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operator</td>
<td>________ Limited (ENL)</td>
</tr>
<tr>
<td>Estimated amount of oil that can be recovered</td>
<td>2.3 billion barrels</td>
</tr>
<tr>
<td>Estimated amount of gas that can be recovered</td>
<td>________ cubic metres</td>
</tr>
<tr>
<td>Date exploration started</td>
<td>1996</td>
</tr>
<tr>
<td>Phase 1 of the project</td>
<td>the development of the ________ oil and gas field</td>
</tr>
<tr>
<td>Date development began</td>
<td>December 2001</td>
</tr>
<tr>
<td>Date natural gas production began</td>
<td>________</td>
</tr>
<tr>
<td>Date oil production began</td>
<td>August 2006</td>
</tr>
<tr>
<td>Production is expected to last until</td>
<td>________</td>
</tr>
<tr>
<td>Drilling technology</td>
<td>Extended Reach Drilling (ERD)</td>
</tr>
</tbody>
</table>

Unit 8 p.50
Updates

Student A

Situation one
You are Mahmoud Hamdi.
Yesterday helicopter flights were cancelled because of bad weather.
You want to find out if there is any news.
You are waiting for some important spare parts.
You want to know if the engineer has put them on the helicopter.
You want to be informed if there is any more news.
You would like two extra flights to take back crew members who have finished their three week tour of duty.

Situation two
You work in the personnel department.
Mahmoud Hamdi has contacted you about two divers for a short-term contract.
You are trying to find two divers for Mahmoud Hamdi.
You have contacted two possible candidates.
Diver one is interested, diver two is going to call back later to give you his decision.
Diver one can begin next week.
Diver one has twelve years’ experience. He has worked offshore in the North Sea and the Gulf of Mexico.
Diver two has six years’ experience. He has also worked offshore in the North Sea and on the Sakhalin project.
Unit 5  p.29
Prepositions

Student A
Describe your picture to your partner. Don’t show your partner the picture!

When you finish, draw the picture that your partner describes to you.
When you both finish, show each other your picture and compare it with the drawing in the book.

Unit 12  p.86
Organizing an exhibition

Student B
You have written to Dr Al-Qatari and you have spoken to his secretary. You are still waiting for a reply.
Suggest Professor Eric Johansson from the Institute of Petroleum as another possible key speaker.
You need to make a decision soon so that you can organize the publicity.

Unit 5  p.31
Options and suggestions

Student B
You are participating in the meeting.
It is about exploiting a reservoir under a mountain range.
Give your opinion. You think it is possible to drill a vertical well in one of the valleys. You can then run different deviated wells from the same borehole. That way you can exploit a bigger area. You would then need a pipeline to carry the oil around the mountain, but that can be cost-effective.
You could then have a deviated well, or horizontal drain well from the main well. This is good if the subsurface is fractured.
Listen to each other’s views and promise to do what A asks.

Unit 11  p.77
Making arrangements on the phone

Student A
a You are the regional manager. Phone your commercial manager to arrange a meeting. You want to discuss closing one of the filling stations he / she is responsible for. You want to meet at the beginning of next week in the afternoon if possible.
b You are the commercial manager. You will receive a call from your regional manager. You are on a safety course Tuesday, Wednesday, and Thursday next week.
Unit 2 p.14

Checking understanding

Student B

Look at your notes. Ask and answer questions to complete your table with information about the other field. Look at the examples.

EXAMPLES

What is the name of the oilfield? Tengiz oilfield

Can you spell that, please? T-E-N-G-I-Z.

Where is Kazakhstan? It's north / north-east of the Caspian Sea.

Did you say Haspian? No! Caspian.

C-A-S-P-I-A-N.

How much oil is there? 6 to 9 billion barrels.

Could you repeat that, please? 6 to 9 billion barrels.

<table>
<thead>
<tr>
<th>Name of the oilfield</th>
<th>Tengiz oilfield</th>
</tr>
</thead>
<tbody>
<tr>
<td>Country</td>
<td>Kazakhstan</td>
</tr>
<tr>
<td>Where the country is</td>
<td>North / north-east of the Caspian Sea</td>
</tr>
<tr>
<td>Start of production</td>
<td>1993</td>
</tr>
<tr>
<td>How much oil</td>
<td>6-9 billion barrels</td>
</tr>
<tr>
<td>Which oil companies</td>
<td>Joint venture of companies called TengizChevroil (TCO)</td>
</tr>
<tr>
<td>Oilfield location</td>
<td>Onshore</td>
</tr>
<tr>
<td>Oil transport</td>
<td>Mostly through Caspian Pipeline Consortium pipeline to Black Sea port, Novorosissyk</td>
</tr>
</tbody>
</table>

Unit 12 p.86

Organizing an exhibition

Student C

You have received the drinks. You need to put them in the fridge. You need cups and glasses and someone to serve them. You want to know about hot drinks (tea and coffee).

You are still waiting to hear from the restaurant that is going to provide the food.

You have contacted a security firm that can provide guards for the three days. The ministry will pay the costs.
Unit 3 p.18
Exchanging information

Student B
You have some information about the chemical composition of natural gas. Enter your information in the table, then answer your partner’s questions. Ask questions with How much to complete the column about crude oil.

Example
How much carbon is there in crude oil?
In natural gas, there is approximately
65–80% carbon
0–0.2% hydrogen
1–15% sulphur. Hydrogen sulphide (H₂S) may be mixed with natural gas. Sweet natural gas – no H₂S. Sour natural gas – measurable amounts of H₂S.
1–15% nitrogen
0% oxygen

<table>
<thead>
<tr>
<th>Crude oil</th>
<th>Natural gas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon</td>
<td></td>
</tr>
<tr>
<td>Hydrogen</td>
<td></td>
</tr>
<tr>
<td>Sulphur</td>
<td>sweet</td>
</tr>
<tr>
<td></td>
<td>sour</td>
</tr>
<tr>
<td>Nitrogen</td>
<td></td>
</tr>
<tr>
<td>Oxygen</td>
<td></td>
</tr>
</tbody>
</table>

Unit 5 p.29
Prepositions

Student B
Describe your picture to your partner. Don’t show your partner the picture!

When you finish, draw the picture that your partner describes to you.
When you both finish, show each other your picture and compare it with the drawing in the book.
Unit 7 p.44
Sharing information

Student B

<table>
<thead>
<tr>
<th>Location</th>
<th>Sakhalin island is on the east coast of Russia. On the east coast of the island there are three offshore fields – ___________, Odoptu, and Arkutun Dagi.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operator</td>
<td>Exxon-Neftegas Limited (ENL)</td>
</tr>
<tr>
<td>Estimated amount of oil that can be recovered</td>
<td>___________ barrels</td>
</tr>
<tr>
<td>Estimated amount of gas that can be recovered</td>
<td>485 billion cubic metres</td>
</tr>
<tr>
<td>Date exploration started</td>
<td></td>
</tr>
<tr>
<td>Phase 1 of the project</td>
<td>The development of the Chayvo oil and gas field</td>
</tr>
<tr>
<td>Date development began</td>
<td>December ___________</td>
</tr>
<tr>
<td>Date natural gas production began</td>
<td>October 2005</td>
</tr>
<tr>
<td>Date oil production began</td>
<td>___________</td>
</tr>
<tr>
<td>Production is expected to last until</td>
<td>2050</td>
</tr>
<tr>
<td>Drilling technology</td>
<td>___________ (ERD)</td>
</tr>
</tbody>
</table>

Unit 8 p.50
Updates

Student B

Situation one
You work in the logistics department of the oil company. Mahmoud Hamdi is contacting you about flights.
At the moment the weather has improved.
If it is still OK this afternoon, you can begin flights.
The engineer has loaded the helicopter with the important spares.
You can only organize one extra flight today.
The second flight will have to be tomorrow (if the weather stays good).
Promise to call him with any news.

Situation two
You are Mahmoud Hamdi.
Last week you asked personnel to find you two divers to carry out some important sub-sea maintenance work.
You haven't had any news and you feel a little bit angry. Now you want an update because you want the work to happen soon. It is a safety issue.
You want to know if they have found any suitable candidates. Ask about their experience.
Find out when they can begin.
Unit 9 p.65
Using visuals in a presentation
Student B
Pipes to carry crude oil are made from steel or plastic. The smallest pipes have an inner diameter of 10 cm. The largest pipes can be 120 cm in diameter. Most pipelines are buried between 1 and 2 m deep. Pumping stations keep the oil moving along the pipeline. It flows at about 1 to 6 m/s.

Pipelines for natural gas are constructed of high quality carbon steel. They measure from just over 5 cm to 150 cm in diameter.

Unit 10 p.74
Problem solving
Student B
You are the overall manager of the pipeline. You have been worried about the flow of oil in the pipeline. Your technician has sent a diagnostic pipeline inspection gauge down the length of the pipeline. You want to know the results.

You do not want to close the pipeline down. The next shutdown is scheduled for three weeks’ time. See if it will be OK until then. You don’t want the line to break down!

You will ask if it is possible to create another station halfway down the line. This will save time. It will allow you to clean sections of the pipeline and not the whole thing.

Unit 11 p.77
Making arrangements on the phone
Student B
a You are the commercial manager. You will receive a call from your regional manager. You have booked a day off work on Monday. You are always busy before nine o’clock and after three o’clock.
b You are the regional manager. Phone your commercial manager to arrange a meeting. You want to discuss building a new filling station. He / she will be responsible for it. You want to meet some time next week.

Unit 12 p.86
Organizing an exhibition
Student D
You have received requests for stands from thirty oil companies, businesses, and schools. There are eight places left.

You think that 1,200 euros is a fair price for a stand for three days.

Unit 5 p.31
Options and suggestions
Student C
You are participating in the meeting.
It is about exploiting a reservoir under a mountain range.

Listen to Student B’s opinion and give your view:
A vertical well in a valley is possible, but then you would need to have a pipeline around the mountain. You think that this is expensive and risky if there isn’t enough oil.

You think a deviated well under the mountain is the best way. This will be longer and more complicated, but you won’t need a pipeline.

Listen to each other’s views and promise to do what A asks.
## Irregular verbs

<table>
<thead>
<tr>
<th>Infinitive</th>
<th>Past Simple</th>
<th>Past Participle</th>
<th>Infinitive</th>
<th>Past Simple</th>
<th>Past Participle</th>
</tr>
</thead>
<tbody>
<tr>
<td>be</td>
<td>was / were</td>
<td>been</td>
<td>know</td>
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<td>known</td>
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<td>become</td>
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<td>become</td>
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<td>laid</td>
<td>learnt / learned</td>
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<td>sink</td>
<td>sunk</td>
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<tr>
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<td>froze</td>
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<td>speak</td>
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<td>get</td>
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<td>spend</td>
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<tr>
<td>give</td>
<td>gave</td>
<td>given</td>
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<td>spilt / spilled</td>
<td>spilt / spilled</td>
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<tr>
<td>go</td>
<td>went</td>
<td>gone / been</td>
<td>take</td>
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<td>grow</td>
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<td>think</td>
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<td>hear</td>
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<td>hurt</td>
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<td>hurt</td>
<td>write</td>
<td>wrote</td>
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</tr>
</tbody>
</table>
1 Routines and activities, Describing responsibilities

Routines and activities
We use both the Present Simple and Present Continuous to talk about routines, and to describe activities.

Present Simple
Positive
I work with several other nationalities.
= subject + infinitive (+s for he / she / it)

He works on an oil rig.
NOT He work on an oil rig.

Negative
I don’t work on an oil rig.
= subject + do / does + not (don’t / doesn’t) + infinitive

He doesn’t work on an oil rig.
NOT He don’t work on an oil rig.

Questions
Do they work at the main refinery?
Yes, they do.
No, they don’t.
= Do / Does + subject + infinitive

We use the Present Simple to talk about
• general facts
  Oil travels to the refinery in a tanker or by pipeline.
• things that happen regularly
  Two billion tonnes of oil travel by tanker each year.
• personal information
  I travel to work by car.

It is common to use an adverb of frequency with the Present Simple, such as: never, hardly ever, sometimes, often, usually, always. Note that these go before the main verb, but after be.

I often play volleyball after work.
We are usually very tired after our shifts.

We also use other time expressions such as: most of the time, twice a week, every day. These can go at the beginning or at the end of a clause.

Most of the time, I work offshore.
I work offshore most of the time.

Present Continuous
Positive
I am working on a design for a pipeline.
= subject + am / is / are + -ing form

Negative
The system isn’t working properly.
= subject + am / is / are + not + -ing form

Questions
Are you working offshore this week?
Yes, I am.
No, I’m not.
= Am / Is / Are + subject + -ing form

We use the Present Continuous to talk about
• an action that is happening now
  They’re talking to the designer right now.
• an action that is happening over a longer period around now
  He’s studying to be an engineer.
• a change in routine
  I usually play volleyball twice a week, but this evening I’m working late.

We use the Present Continuous with time expressions such as: now, right now, currently, at the moment, this week, today. These can go at the beginning or at the end of a clause.

Right now we are updating the control rooms for the refinery.
A new trainee is following me around this week.

Note that with a continuous tense such as the Present Continuous, we can’t use non-action verbs such as: believe, cost, dislike, hate, know, like, mean, prefer, remember, understand, want.
I want to know more about petroleum engineering.
NOT I’m wanting to know more about ...

Describing responsibilities
We can use verbs as well as expressions to talk about our jobs and responsibilities.
**Verbs**

These include look after, monitor, oversee.

**I look after** the machinery on the oil rig.
**He monitors** safety on board the rig.
**The head of the team oversees** every stage of the process.

Note the use of the Present Simple to give general facts about ourselves or others.

**Expressions**

These are used with be, and include:

- (be) in charge of + noun or -ing form
  
  She’s in charge of the facility.
  I’m in charge of ensuring that safety procedures are followed.

- (be) involved in + noun or -ing form
  
  We are involved in identifying the best places to drill for oil and gas.

- (be) responsible for + noun or -ing form
  
  They’re responsible for designing the piping systems.

We can also introduce our job responsibilities by saying My job is to + infinitive.

**My job is to ensure** that safety procedures are followed.

**Questions**

<table>
<thead>
<tr>
<th>Did people realize how important oil could be?</th>
<th>Yes, they did.</th>
</tr>
</thead>
</table>

= *Did* + subject + infinitive

To form the Past Simple in the positive, we add *d* or *ed* to the infinitive.

**live** → **lived**
**want** → **wanted**

Some common verbs, such as be, do, go, or have, are irregular.

**be** → **was, were**
**do** → **did**
**go** → **went**
**have** → **had**

There are many other irregular verbs (find → found, take → took), whose forms have to be learned individually. (See irregular verbs, p. 114.)

Note that when we use the Past Simple with be, we do not use the auxiliary did in the negative or in questions.

**Was oil as important as salt in the past?**
**NOT** Did oil be as important as salt?

**Time expressions**

We often use time expressions with the Past Simple.

**In 1929, Venezuela was the second largest oil exporter in the world.**

---

3 **Nouns and articles**

Nouns can be countable or uncountable. Both types can be used with the.

**Countable nouns**

These can be singular or plural. In the singular, they are used with a / an or one. In the plural, they can be used with numbers or other expressions.

- a tanker
- three molecules
- an oil refinery
- several platforms
- one litre

The verb agrees with the countable noun.

**The tankers carry** huge amounts of oil.
Uncountable nouns

These have no plural form. Nor do we use a / an or numbers with uncountable nouns, as they cannot be counted. Examples include fuel, mud, oil, time.

NOT a mud, two fuels

Uncountable nouns always have a singular verb form.

Oil is transported in tankers.

Some nouns, such as fuel, oil, and rock, can be both countable and uncountable.

The rig is built on rock. (= rock as a material)

Some rocks contain both oil and gas. (= individual rocks)

When talking about quantities in negatives and questions, we can use much with uncountable nouns and many with countable nouns. We can use a lot of with countable and uncountable nouns.

There isn't much / a lot of time.
Are there many / a lot of pipelines?

Articles: a / an, the or no article

We use a / an with singular countable nouns to talk about something in general.

They are building a new pipeline.

We use the before countable and uncountable nouns

• when we are referring to a specific thing or to something that is known to the speaker or listener

He is working on the rig. (= everyone knows which rig)

• when something has already been mentioned

An error occurred in the system. Unfortunately, the error was not spotted.

• with the names of rivers, seas, oceans, canals, and with mountain ranges and many regions

the Amazon, the Pacific Ocean, the Himalayas, the Far East

We use no article when we refer to uncountable and plural countable nouns in a general sense. Compare the following two sentences:

The organic matter is compressed and air cannot reach it.
When the valve is opened, the air inside escapes.

4 The Passive

Active

We use the Active when we know who or what does an action, and we feel that it is relevant or important to give this information.

Geologists study the structure and composition of the earth. (= this is what geologists do)

The mud helps to control the pressure.

= subject + verb

Passive

We use the Passive when we don’t know who does an action, or when it is irrelevant.

The rock samples are taken to the lab. (= this is the process; it doesn’t matter who takes them)

Core samples are kept for analysis.

= subject + present simple of be + past participle

In the examples of the Passive above, we use the present simple of be. It is also possible to use other tenses of be to describe actions in the past or future.

We can use Active and Passive forms with structures such as can and will.

ACTIVE We can drill from onshore.

I will contact the exploration team.

PASSIVE Oil can be drilled from onshore.

(= a fact about oil)

The exploration team will be contacted.

(= it doesn’t matter who contacts them)

Passive with by

We often use the Passive when describing a process or system. If we want to say who or what causes something to happen in a process, we often use by after the Passive rather than changing the sentence to an Active form.

Shock waves are produced by explosives in the ground.
5 Prepositions

We can use prepositions to describe where people or things are, and to describe movement. Common prepositions of place include

above, around, at, behind, between, from, in, in front of, next to, opposite, outside, over, under, up.

These are used with be.

Pipelines under the sea are expensive to build.

His job is to stand on the monkey board.

There isn't much space between the two sections.

Prepositions of movement are used with many verbs such as jump, move, rotate, travel. Many prepositions of place can also be used as prepositions of movement.

The apparatus moves between the two sections.

Other prepositions that are commonly used to describe movement are across, along, into, onto, through, to.

The mud carries the rock to the surface.
The kelly goes through the rotary table.

6 Cause and result

There are several ways of describing how one action (cause) leads to another action (result). The following examples are all followed by nouns or noun phrases.

<table>
<thead>
<tr>
<th>Cause</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>technical problems</td>
<td>oil spills</td>
</tr>
<tr>
<td>Technical problems</td>
<td>cause oil spills</td>
</tr>
<tr>
<td>Technical problems</td>
<td>are responsible for oil spills</td>
</tr>
<tr>
<td>Technical problems</td>
<td>account for oil spills</td>
</tr>
<tr>
<td>Technical problems</td>
<td>result in oil spills</td>
</tr>
</tbody>
</table>

Note that we use can before the verb to sound less direct or certain.

Technical problems can result in oil spills.

Other ways of expressing cause and result are is / are the result of and happen because of. When we use these expressions, the order of the cause and result is changed.

<table>
<thead>
<tr>
<th>Result</th>
<th>Cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>oil spills</td>
<td>technical problems</td>
</tr>
<tr>
<td>Oil spills are the result of technical problems.</td>
<td></td>
</tr>
<tr>
<td>Oil spills happen because of technical problems.</td>
<td></td>
</tr>
</tbody>
</table>

7 Talking about ability, Asking questions

Talking about ability

We can talk about what is possible and impossible in the following ways.

- can / can’t + infinitive
  
  They can drill in deep water.

- is / are (not) able to + infinitive
  
  The oil is able to move freely in the pipe.

- allow(s) + object + to + infinitive
  
  The hot water jacket allows the oil to move freely in the pipe.

We can use the above structures in the Passive, though is / are (not) able to tends to be used in the Active.

The rig can’t be moved quickly.
The crown block allows the pipe to be lifted.

Note that the infinitive form of be is used with these expressions in the Passive.

NOT: The rig can’t be moved quickly.

Another expression we use when talking about ability is let(s). This is slightly less formal than allow(s), and is not followed by to.

- let(s) + object + infinitive
  
  This action lets the rig go down into the water.

Let(s) is more commonly used in the Active.

Asking questions

Yes / no questions

To ask a simple question that requires a yes or no answer, we begin with an auxiliary verb such as be, do, have, will, can, etc.

Was the project successful?
Did you go into the sub-sea centre?
Has the platform got eight legs?
Can it accommodate many people?

(= auxiliary + subject)

We can use these questions to check information.

Wh- questions

To ask a question that requires more specific information, we begin with a wh- word, or question word. The most common are when, where, what, which, who, why, and also how.
When did production start? Why does the carrier pipe have a hot water jacket? How is the oil brought ashore? (= question word + auxiliary + subject)

We can combine which, what, and how with other words.

Which part of the platform is underneath the sea? How many people live in the sub-sea centre?

8 Past Simple v Present Perfect

Past Simple
We use the Past Simple to talk about completed actions in the past. We often use past time expressions such as yesterday, last week, in 1990, ago, or for (but not since). We can use this tense to answer the question When ...?

He started the course two years ago. I didn’t work in India for very long. Why did you come back to England?

Present Perfect
We use the Present Perfect to talk about a period of time that began in the past and which continues up to the present.

Positive
I’ve lived in India all my life.
= subject + have / has + past participle

Negative
We haven’t met the CEO.
= subject + have / has + not (haven’t / hasn’t) + past participle

Questions
Have you finished reading the report?
Yes, I have. No, I haven’t.

= Have / Has + subject + past participle

We often use the time expressions for (+ period of time) and since (+ specific point in time). We can use this tense to answer the question How long ...?

I’ve worked in Nigeria for five years. He’s been on the North Sea FPSO since 2006. NOT ... since five years

9 Comparative / superlative adjectives

We use comparatives to say that two things are different in some way.

Pipelines are cheaper than tankers and can carry larger amounts of oil or gas.

Pipelines under the sea are more expensive than land.

We use superlatives to compare three or more things.

This isn’t the deepest part of the North Sea. What’s the most complicated part of the process?

Spelling rules

<table>
<thead>
<tr>
<th>Adjective</th>
<th>Comparative</th>
<th>Superlative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short adjective</td>
<td>+ -er / -est</td>
<td>small</td>
</tr>
<tr>
<td>Adjective ending in -e</td>
<td>+ -r / -st</td>
<td>large</td>
</tr>
<tr>
<td>Short adjective ending in vowel + consonant, except -w</td>
<td>double the consonant + -er / -est</td>
<td>big</td>
</tr>
<tr>
<td>Adjective of two or more syllables</td>
<td>more / most + adjective</td>
<td>modern</td>
</tr>
<tr>
<td>Adjective ending in consonant + -y</td>
<td>change -y to -i + -er / -est</td>
<td>early</td>
</tr>
<tr>
<td>Irregular adjective</td>
<td>good</td>
<td>better</td>
</tr>
</tbody>
</table>

Note that the comparative form is followed by than, not that.

With adjectives of two or more syllables, we can use less to mean the opposite of more and the least to mean the opposite of the most.

Undersea pipelines are less economical than those built over land. This is the least expensive option.
10 Forms of the verb

Some verbs are followed by the infinitive with to, and others are followed by the -ing form.

Infinitive with to

We use the infinitive with to
- after certain verbs, including agree, decide, forget, help, hope, help, manage, need, offer, plan, want
  *They wanted to create* a terminal that would operate all year round.
- *We are hoping to complete* the project by next year.
- *I haven’t managed to identify* the problem.
- to introduce a purpose
  *An icebreaker and tug are used to keep the area ice-free.*
- *The company worked hard to meet* the deadline.

-ing form

We use the -ing form
- as a noun
  *Working in* these conditions is an enormous challenge.
  *Taking care of* the environment is the most important part of my job.
- after certain verbs, including avoid, consider, involve, mean, risk, suggest
  *It involved building* an enormous structure.
  *The thickness of the ice meant building* the loading jetty far offshore.
- after prepositions, or verbs and adjectives followed by prepositions
  *After travelling by* pipeline from the Timan-Pechora province oilfields ...
  *The refinery succeeds in* processing 300,000 barrels of crude a day.
  *It is responsible for supplying* 13% of the UK’s petroleum products.

11 Time clauses

We use time words to link one action with another.

*when*

We use *when* to show actions that happen close together in time. The action in the *when* clause must happen before the action in the main clause can occur.

*Gas is pumped down. It pushes out the water.* → *When gas is pumped down, it pushes out the water.*

as

We use *as* to show actions happening at the same time.

*Gas travels through the system. It is pushed by passing through compressor stations.* → *As the gas travels through the system, it is pushed by passing through compressor stations.*

before and after

We use *before* or *after* to put actions in a clear sequence.

*I check what each station sells well. I choose what to buy.* → *I check what each station sells well before I choose what to buy.*

*The gas leaves the gas terminals. It is carried to the customers who need it.* → *After the gas leaves the gas terminals, it is carried to the customers who require it.*

Note that when the time clause comes first, we use a comma.

We never use the future after time words when we are talking about a future action.

*When the pipeline is finished, we will be able to supply gas more efficiently.*

*NOT When the pipeline will be finished ...*

12 Obligation and necessity

There are several ways of talking about obligation and necessity. The following structures are all followed by the infinitive.

**must / mustn’t**

We use *must / mustn’t* to say that something is necessary, often because the speaker thinks it is.

*You must make this your top priority.*

*We mustn’t miss this deadline.*

*NOT We mustn’t to miss ...*

**have to**

We use *have to* when the situation or circumstances make it necessary to do something.

*I have to show something to the design group.*

*Do we have to prepare the schedule or will Ranjit’s team do this?*
**don’t / doesn’t have to**

We use don’t / doesn’t have to to say that something isn’t necessary. It is not an order or instruction like mustn’t, but instead expresses an absence of obligation.

You don’t have to finish the report today. Tomorrow will be fine.
The summary doesn’t have to be too detailed. It’s up to you how long to make it.

**need to**

We use need to in a similar way to have to, to talk about general rules or the requirements of a situation.

I need to receive your estimate today if you want to be considered for this contract.
Do we both need to attend the meeting?

**don’t / doesn’t need to**

We use don’t / doesn’t need to in the same way as don’t / doesn’t have to, i.e. to express an absence of obligation.

You don’t need to finish the report today.
The summary doesn’t need to be too detailed.

Note that we don’t use must as frequently as have to or need to.

---

**13 First conditional, should have done**

**First conditional**

We use the first conditional to talk about a situation and its probable result. We use if to introduce the situation, while the main clause expresses the likely result.

<table>
<thead>
<tr>
<th>If clause</th>
<th>Main clause</th>
</tr>
</thead>
<tbody>
<tr>
<td>If your tools fall while you’re working up there, they will harm someone.</td>
<td>If + Present Simple + will (‘ll) + infinitive</td>
</tr>
</tbody>
</table>

The order of the clauses can be changed round, but note that the subject of the sentence should be clear.

Your tools will harm someone if they fall while you’re working up there.

**NOT** They will harm someone if your tools fall ...

---

**should have done**

We use should (not) have + past participle when we think that someone didn’t take the right course of action.

The equipment should have been checked every day. (= the fact that it wasn’t caused a problem)
The accident was caused by a spark from a vehicle, but the vehicle shouldn’t have been there.

Note that this is a fixed expression.

**NOT** He should not have ...

---

**14 Predicting the future**

Two ways of predicting the future are to use the Present Continuous and will / won’t.

**Present Continuous**

We use the Present Continuous to talk about fixed plans in the future. As the plans have been decided upon, we don’t generally use this tense for a period of time a long way ahead.

I’m doing a course in deep-sea diving. (= I have booked a place on the course)

We often use a future time expression with the Present Continuous to make it clear that we are talking about the future rather than the present.

Future time expressions include: later, tomorrow, soon, next week.

She’s starting her course soon.
**will / won’t**

We use *will / won’t* + infinitive to talk about things that we expect or are sure will happen in the future, and for general predictions.

*When oil and gas run out, we’ll have to get our energy from other sources.*

*It won’t be an easy task, but I’m sure it will be interesting.*

When we think something is possible but we are not sure it will happen, we can use the verb *think* before *will / won’t*.

*I think I’ll look for a job on an oil platform.*

When the prediction is negative, we use *I don’t think* + *will*.

*I don’t think it’ll be easy.*

We can also use *could, may, or might* + infinitive to make uncertain predictions about the future.

*I could live with my brother or I might get a flat with my friend.*

*They may not finish the project on time.*

We also use *will* (‘ll) to make an instant decision about something.

*Mrs Taylor isn’t here today, so I’ll show you where everything is.*

**Present Continuous**

We use the Present Continuous to talk about future plans and arrangements. In order to make it clear that we are referring to the future rather than the present, we often use future time expressions such as *later, tomorrow, on (Friday), next (month).*

*We’re all doing a safety course in May.*

*I’m working at Head Office next week.*

Note that the Present Continuous and *going to* are used in a similar way when talking about arrangements. However, the Present Continuous suggests that the plan or arrangement is definite, while *going to* can convey simply an intention.

*He’s leaving his job on Friday.* (= definite)

*He’s going to leave his job on Friday.* (= definite)

*He’s going to leave his job.* (= this may be definite or simply an intention to leave)

**Present Simple**

We use the Present Simple to talk about events that are part of a timetable. As with the Present Continuous, we use future time expressions to make it clear that we referring to a situation in the future.

*The course starts tomorrow.*

*The flight leaves at 06.10.*
Listening scripts

Unit 1

Listening

Part A
When it comes out of the ground, crude oil is black, green, or even clear. It's not very useful in its original state, so it has to be refined in an oil refinery. It travels there by water in a tanker or by pipeline. Two billion tonnes of oil travel by tanker each year across the seas. They carry eighteen million barrels of oil through the Straits of Hormuz in the Gulf every day. Pipelines vary in length. The longest pipeline in the world is the Druzhba pipeline that runs 4,000 kilometres from south-east Russia to the Czech Republic and Germany. It can transport over a million barrels each day.

Part B
When we measure oil, we usually talk about barrels. A barrel of oil contains 42 US gallons, but it can make 44 gallons of petroleum products. The main use of crude oil is to produce fuel for energy. After it reaches its destination, crude oil is changed into different petroleum products. Just over nineteen gallons become petrol or gasoline. Another nine gallons become diesel, and four gallons are used as jet fuel. The rest is turned into heavy fuel oil, heating oil, and LPG - that's liquid petroleum gas. The last seven gallons are changed into other products.

Part C
This amazing range of products made from petroleum ranges from ammonia, to the bitumen we put on our roads, to plastics. But there are other products whose connection with petroleum is hard to imagine. For instance, the gum you chew and the deodorant you use may both use petroleum. Incredible, isn't it?

Vocabulary

Exercise 3
1 land surveyor
2 maintenance technician
3 petroleum chemist
4 piping designer
5 refinery manager
6 safety officer

Exercise 4
1 I work offshore most of the time; I look after the machinery and keep everything in working order. The aim is that nothing breaks down, but if it does, I'm there to repair it.
2 I monitor safety on board the rig and make sure there are no accidents. A new trainee called Hamdan is following me around this week. I am showing him what the job involves.
3 I have a lot of responsibility. I'm in overall charge of the facility and oversee everything from the arrival of the crude oil. Of course, I have a big team of managers and specialist engineers who report to me.
4 I design the piping systems that carry the oil and gas around the refinery. At the moment, I'm working on a design for a pipeline for a new gas field.
5 I'm involved in the exploration stage. My job is to identify the best places to drill for oil and gas. We use a number of different techniques to help us, for example aerial photography and seismic exploration.
6 My job is to analyse samples for traces of hydrocarbons. These samples can be rock or soil samples, or even samples from the ocean.

Speaking

Conversation A

G = Mr Gibson, A = Dr Al Harbi, H = Hamdan
G Good afternoon, Dr Al Harbi.
A Hello, Mr Gibson. Good afternoon. How are you today?
G I'm very well thank you, and you?
A I'm fine, thank you.
G May I bother you a moment? I'd like to introduce you to my new trainee. This is Hamdan Al Nuami, it's his first week.
A Welcome to the refinery. I'm very pleased to meet you, Hamdan.
H How do you do, Dr Al Harbi.
A So how are you finding it so far?
H I'm very happy to be here. There's so much to learn.
A Well, Mr Gibson is an excellent teacher. Please excuse me; I have to go to a meeting. I hope to see you again soon.
H I look forward to it. Goodbye, Dr Al Harbi.

Conversation B

G = Mr Gibson, F = Farid, H = Hamdan
G Farid, have you got a minute? I want you to meet someone. This is Hamdan - he's a new trainee too.
F Hi, Hamdan, nice to meet you.
H Nice to meet you.
F So, how's it going?
H I'm having a great time, thanks. I'm learning a lot. What about you?
F I'm with one of the piping designers. In fact, he's beeping me now. Sorry, I have to go.
H Bye.
F Yes, see you around.

Unit 2

Listening

So, when did people begin to use oil? Well, we know that people used oil about four thousand years ago in the Middle East. They used it on the outside of boats and ships. This was to make them waterproof. They also used it when they were building. They put it between the building stones. They found the oil in small pools. There was also oil along river banks. It simply seeped from below the ground to the surface and collected there in pools. At about the same time, people in Egypt and Japan used oil to light their homes. They also used oil as medicine to treat several illnesses. And we also know that bitumen was used on the early streets of Baghdad. Bitumen is a black, almost solid form of oil ...

People drilled oil thousands of years ago in China. The interesting thing is that they didn't want oil. They wanted salt. The oil wasn't important so they threw it away. But in the middle of the nineteenth century, people realized how important oil could be. They found they could distil oil to produce kerosene which they burned in oil lamps to light their homes. This happened in several different countries - in America, Russia, and Romania.

People didn't use oil as a fuel for transport for many years. That changed when the automobile - the car - was invented. When they distilled oil to make kerosene for lamp oil, they also produced petrol, or gasoline, and this became a very important product.

The car was the real start of the oil industry. Today, oil is used for lots of things - fuel for cars, lorries, aircraft, heating and cooling of buildings, and it's also used in many industrial processes. For example, it's used to make plastics, medicine, fibres, and detergents ...

Pronunciation

collected used visited
invented burned drained
produced wanted analysed
seeped distilled invested
stored drilled worked

It's my job

I work as a recording helper, or jug hustler. When oil companies are exploring for oil, they have to start by studying rock formations in an area. They want to find out what's below the surface of the ground and hopefully find oil. So they employ geophysicists to study the physical characteristics of rocks. The geophysicists
Unit 3

Listening

T = teacher, A, B = students

T As you all know oil and gas are fossil fuels. Can someone tell me what that means?
A It means that they are formed from plants and animals.
T Yes, plants and animals that lived millions of years ago. The oil and gas we extract today were formed between ten and 160 million years ago. Seas and wet areas are rich in bacteria and microscopic plants and animals, known as phytoplankton and zooplankton. When they die, they sink to the bottom of the water and form thick layers of organic matter. This gets slowly covered in layers of mud, sand, and other mineral deposits. These sedimentary layers build up on top of each other. What do you think happens to the temperature and pressure, Dani?
B Er... the pressure increases?
T That's right. As the layers increase, the pressure and temperature rise too. There is no air in the organic matter but anaerobic bacteria, which live without oxygen, begin to work on the organic matter and change it. As this happens, wax, fat, and oil from the buried organic matter form dark spots called kerogen. Rocks that contain oil and gas in this form are known as source rocks. In this diagram, you can see that the source rock is the bottom layer. Deeper down, the temperature rises further. Chains of hydrocarbons became shorter and break away to give light oil and gas.
B I've heard that oil from the North Sea is light oil.

T Yes, that's right. Well, we know that oil and gas are less dense than water, so the oil and gas that have formed in this way begin to slowly move upwards into porous rocks that have larger spaces in them. These spaces are known as pores. Can someone tell me the name of a porous rock?
A Sandstone?
T Yes, that's a good example. These porous rocks are reservoir rocks. However, oil and gas continue to rise until they reach the surface of the ground or become trapped under a layer of impermeable trap or cap rock. You can see this in the diagram, here...

Unit 4

Pronunciation

Exercise 1
geologist
geophysicist
geochemist

Exercise 3
petroleum geologist
petroleum geophysicist
petroleum geochemist

Listening

Part A
I = interviewer, B = Dr Bell
I Are people using more oil?
B Yes, oil consumption keeps rising. Between 1994 and 2006, it went up 1.7% a year. In fact, in one year, between 2003 and 2004, it increased by 3.4%. The main reason for this increase is the development of China and India. In China, for instance, consumption doubled between 1996 and 2006, and it has grown by 8% each year since 2002. By 2030, it is expected to rise to about 120 million barrels a day, but much will depend on the world economy.

Part B
I What are the main uses of oil?
B Well, in order of importance, the four principal uses are transportation, domestic - you know, for heating people's homes, commercial, and, in fourth place, industrial. But there are big differences between countries. Globally, over half of all the oil we use is for transportation, but in the US, this goes up to 70%. And in China and India, most oil is for industry. Of course, this is probably going to change as more people in these countries buy their own cars. One day, transportation will become their principal reason for oil consumption as elsewhere. So the situation is changing all the time.

Speaking

S = Steve, R = Rafiq, A = Amin
S What do you think about the oil sands, Rafiq?
R Well, it's a good opportunity for Canada to get oil and make money.
A Mmm, yes. But it's risky too. It's very expensive to process. It's OK if the price of oil is high, but when the price is low, it isn't profitable.
S I hear what you're saying, but in my opinion, there are things that are more
important than money. They should think about the environment as well. Some people say they're going to destroy a big area of forest.

R Yes, but they can replant the forest afterwards. Oil companies respect the environment these days. What's your view, Amin?

A In my opinion, they should leave the oil where it is. We want to sell them our oil first!

Unit 5

Listening

S = Simon, J = Jack

S So tell me, Jack, who's in charge of the rig?

J You could say the 'company man,' because he represents the oil company that is paying for the drilling. He checks they're drilling the well the way his company wants.

S I see, but he doesn't do the drilling himself? Who's in charge of the drilling team?

J The drill pusher. He's in overall charge of everything that goes on. When they're drilling, he's there day and night.

S That's a big responsibility. How many people does he have in his team?

J That all depends, but his second-in-command is the driller. He stands on the platform called the monkey board. He supervises each time they add and remove a piece of the drill string. Each time they want to add or take off a pipe, they need to lift part of the drill string out of the well and lower it again. This is called tripping out and tripping in.

S What an amazing expression. I know that there are some funny names for crew members too. Like the mud man. Why is mud important?

J There are three main reasons. First of all, it helps to lubricate the drill.

S Like oil in a motor?

J That's right, otherwise the drill bit gets too hot.

S And the other reasons?

J The mud carries the rock that has been drilled to the top; you know, it brings it up through the borehole to the surface. Mud also helps to control the pressure in the well.

S Is the mud the kind of stuff we find in the garden?

J Not exactly. It is usually a mixture of different things. So the mud man you talked about is the engineer who is in charge of the mud supply.

S Oh, right. So who else is there, then?

J Well, there's the motor man who's in charge of the motors. He's important because if the motors break down, the equipment doesn't work. And we mustn't forget the roughnecks and roustabouts. Basically, the roustabout is a general helper who does whatever is needed to support the team.

S And what about the roughnecks?

J Well, they're the guys on the drilling floor. They move the pipes and join them up. Roughnecks are strong tough guys who do physical work in difficult conditions. That's how I started out in the business.

Speaking

A = Ali, S = Saleh, M = Mark

A OK, everyone. So let's talk about the best way of exploiting the new site. What do you think, Saleh?

S It's not very far offshore. How about drilling from onshore? We could start round about here.

A Yes, that's possible. What's your view, Mark?

M Saleh is right, drilling from onshore is less expensive. But an offshore rig can exploit a bigger area. We don't know how big the field is.

A Yes, but going offshore is very expensive.

S That's true. Why don't we compare the costs of a semi-submersible with a full platform?

A Yes, that's a possibility. But before we go any further, we need to look at the results again with the exploration team. Can you arrange a meeting with them next week, Saleh?

S Yes, certainly. I'll contact them after the meeting.

A That's good. And Mark, will you compare the costs of the different methods?

M Yes, of course.

A Let's have another meeting later this week. Shall we say Thursday at ten o'clock? I'd like to make a final decision before the end of the month. Thank you for coming.

Pronunciation

1 We could drill from onshore.
2 How about comparing the costs?
3 Why don't we compare the costs?
4 Shall we say Thursday?
5 Can you arrange that for next week, Saleh?

Unit 6

Pronunciation

Exercise 1
waste  rocks  disaster  economy  damage  sand  accident  result  drilling  tanker  problem  pollution  aircraft  environment  error  effects

Exercise 2
tanker  damage  results  effects  drilling  error  problem

Exercise 3
sector  river  people  ocean  mistake  amount  members  training  measures

Listening

R = reporter, S = scientist

R We often read and hear that the oil industry causes pollution. When does oil cause pollution?

S Well, the oil industry has to find oil, drill for it, transport it, build tanks to store oil, and refine it. After that we burn oil to give energy or we use it to make other products. Pollution can happen at each stage of the process.

R And is there a way we can reduce this pollution?

S Yes, new technology is helping. Oil companies don't need to drill so many wells today. One well can now reach oil in a much bigger area.

R Of course, most people remember accidents with oil tankers or burst pipelines that cause serious damage to the environment. The Exxon Valdez was one example. Does transportation cause the most pollution?

S Actually, no, it doesn't. Of course, an accident with a ship or a leak from a pipeline can cause a lot of pollution to water and land. But now tankers have a double hull to make them safer.

R Yes, that's important. So the oil industry causes pollution of land and sea. And how does oil cause air pollution?

S That's when we burn oil to give us energy. We use oil products as a fuel in our cars and aircraft. We also make electricity by burning gas. When we burn oil, we produce carbon dioxide. We now know that carbon dioxide is one gas that is making the world warmer. We call this global warming. Burning diesel and petrol in vehicles also produces
particulates. These are very small particles of soot. They can cause health problems, things like asthma and other problems with breathing.

R Air pollution's clearly a big problem. How can the oil industry reduce air pollution?

S Mainly through technology. The oil industry makes fuels that produce less pollution. Also, car makers now make car engines that use less fuel and burn fuel more efficiently. And in industry, there's new technology to stop carbon dioxide and other gases going into the air.

R Yes, I know that this subject's very important. Does oil cause any other kinds of pollution?

S Yes, light pollution. At an oil refinery or a gas platform, you can sometimes see gas burning. This is flaring. It produces a strong light. People don't like it when this happens at night. And, of course, oil and gas are used to generate electricity to light our towns and cities around the world and this causes light pollution too.

R Yes, indeed. So, what will happen in the future? ...

**Unit 7**

**Listening**

A The Britannia field was discovered about 1975. It's in the North Sea about 210 kilometres north-east of the Scottish coast.

B And who operates it?

A Two companies operate together – Conoco and Chevron.

B And are Conoco and Chevron equal partners?

A Yes, they operate the platform jointly.

B And how deep is the water there?

A Well, it's about 150 metres deep.

B Is that the deepest part of the North Sea?

A No, the maximum depth is about 700 metres. There's a sub-sea centre about fifteen kilometres from the platform. There's a very large pipe called the carrier pipe. It's 94 centimetres in diameter. Inside it there are several flowlines that are packed together.

B And it must be cold at that depth, so how do you make sure the gas and oil don't become thick or solid in the pipe?

A Well, that's what's very interesting! The carrier pipe has a hot water jacket around it. This was the first time that hot water was used in such a system. Hot water is pumped from the platform to the manifold and back again in a closed system.

B So it travels a long way!

A Yes.

B Tell me about the part of the platform that is under the water.

A Well, to support the platform there are twenty foundation piles in the seabed. These are large posts or poles. They used underwater hammers to drive them down to 105 metres.

B That's amazing!

A Yes. In fact they are the largest piles in the North Sea!

B And then there are eight legs?

A Yes, that's right. Eight. Engineers had to lay large mud mats on the seabed to hold the weight of the platform.

B How much does this cost?

A You can see the cost is over 140 people.

B So it's like a small town?

A Yes, it is. These people are there 24 hours a day. There's nowhere else to go.

B I'm not sure I'd like that! But tell me, how does the oil and gas get ashore?

A There's a pipeline to a terminal on the mainland for gas and the condensate is piped to another platform and into a different pipeline system.

**Pronunciation**

1. Does ERD mean Extended Reach Drilling?
2. When did your course begin?
3. Are you a mechanical engineer?
4. Have you got an offshore safety certificate?
5. Why are oil companies exploring around Greenland?
6. Whose is it? It's time to get a well?
7. Can you use CAD programs?
8. Would you like to work offshore?

**Unit 8**

**Listening**

H = Hermann, S = Stuart

**Part A**

H How long have you worked in the oil business, Stuart?

S Over 25 years. I graduated in 1984 and joined an oil company. I've been with this company since 1998. I've worked in Texas, Saudi, the Gulf of Mexico.

H What was your first job?

S Well, I started as a roughneck. That was my first job before I went to university.

H Have you ever worked in Africa?

S Yes, I have.

H When did you work there?


H Has most of your career been onshore or offshore?

S Mostly offshore. In Nigeria, I worked on an FPSO. I've been on North Sea FPSOs since 2001.

**Part B**

H What exactly is an FPSO?

S Well, the letters stand for Floating Production, Storage, and Offtake facilities. When the well has been completed, the drilling platform goes and an FPSO takes its place. Imagine the hull of a huge oil tanker with the equipment you normally find on a platform, but without the drilling rig. The oil from the well head flows up through flowlines and is processed. Basically we separate the oil from water and gas. We then store it in the hull until a tanker comes along and takes it off.

H OK, now I understand; but why use an FPSO in the first place? Can't you transport the oil by sub-sea pipeline?

S Yes, but this is too expensive if you're drilling in deep water a long way offshore.

**Part C**

H How many people work on an FPSO?

S Well, there are usually between 50 and 100.

H What's the biggest one you've ever worked on?

S The one in the Bonga oilfield off the Niger Delta. The hull is about 300 metres long by 60 metres wide.

H What a monster!

S Yes, it was built in Korea then fitted out in Tyneside in the UK, where 22,000 tonnes of topside equipment were installed. After that, it was towed to Nigeria where it's connected to sixteen sub-sea production wells.

**Pronunciation**

**Exercise 1**

1. measure  2. pressure  3. ensure

**Exercise 2**

1. a destination  
2. e explosion  
3. compression  
4. d technician  
5. f desalination  
6. g friction  
7. h transmission
Speaking

M = Mahmoud, S = Steve, H = Hamish

M Hello, Steve. What’s the situation with the separator pump?
S Well, it broke down again this morning, but we managed to fix it.
M Have you identified the problem yet?
S Yes, we have - basically it’s old and worn out.
M Is it worth repairing? It’s gone wrong three times this week.
S I don’t think so. It needs too many new parts. It’s going to keep on giving us trouble.
M Right, you’d better change over to the replacement pump. Can you find me the details and I’ll order a new one?
M How are you getting on with the broken lighting on F gangway, Hamish?
H Well, we haven’t located the fault yet.
M Keep on looking for it - we don’t want to have an accident. And in the meantime, can you put up some emergency lighting? It’s dangerous the way it is.
H I’ve already installed some emergency lighting. I’ve just tested it and it works.
M That’s great, Hamish. Good man. Keep me informed when it’s working again.

Unit 9

Listening

Part A

We can use tankers to transport oil, gas, and refined petroleum products at sea, on roads, or on railways. Or we can use pipelines. Today, there are thousands of kilometres of pipelines throughout the world. So what are the advantages of using pipelines? Well, compared to tankers, pipelines are usually more economical over land. This is because they are cheaper to build and they can carry larger quantities of oil or gas than tankers. But the oil or gas inside a pipe can cause corrosion and weaken or destroy the metal. This can result in leaks in the pipes. Also, crude oil contains different amounts of wax or paraffin, and in colder climates, this builds up along the pipeline. These pipelines have to be inspected and cleaned regularly. Pipelines can also be built under the sea, but this is more expensive and technically more difficult. There are sub-sea pipelines connecting the Norwegian offshore gas fields in the North Sea to European terminals. There are also sub-sea pipelines from North Africa to Italy. Sub-sea pipelines have to be coated on the outside to prevent corrosion from seawater.

Part B

Many pipelines carry oil, gas, and refined products across international borders between countries. This creates another problem. If there is a disagreement between two countries, the gas or oil supplies through the pipeline may be cut off. Also, pipelines are sometimes attacked and damaged for political reasons. This can cause a lot of damage to the environment and cost a lot of money.

So now, some countries use pipeline automation systems. These systems can be operated from a central office. Engineers can monitor the pipeline remotely from the office. If there are any failures in the pipeline, they know about it immediately.

Speaking

If there are any failures in the pipeline, they know about it immediately. Now I’d like to talk about the trans-Siberian pipeline. The trans-Siberian pipeline carries natural gas from western Siberia to central and western Europe. It took two years to construct. The project began in 1982 and the pipeline was finished in 1984.

Here you can see some technical information about the pipeline. As you can see, the pipeline is 4,500 kilometres long and it has a diameter of 142 centimetres. Each year it carries 32 billion cubic metres of natural gas from the western Siberian gas fields. Along the length of the pipeline there are 42 compressor stations which push the gas through. In parts of Siberia, temperatures are often below minus 40 degrees Celsius. This photo shows the pipeline on supports above the ground. This is to protect it from the frozen ground below. So, are there any questions before I move to my next point?

A Can you tell us about...

Pronunciation

Exercise 1

1 So, the trans-Siberian pipeline is 5,400 kilometres long?
No, it’s 4,500 kilometres long.
2 So, you’re from Austria?
No, I’m from Australia.
3 Is the tanker 300 metres long?
No, it’s 380 metres long.
4 Is the oil well offshore?
No, it’s onshore.

Exercise 2

Did it start last month?
No, it started last week.

1 Is it cheaper by tanker?
No, it’s more expensive by tanker.
2 Is it 130 metres long?
No, it’s 120 metres long.
3 Is he working in Europe?
No, he’s working in the Middle East.
4 Is the meeting on Thursday?
No, it’s on Tuesday.
5 Does it hold three million litres?
No, it holds three thousand litres.

Unit 10

It’s my job

I = interviewer, J = Jassem

I So tell me Jassem, just how big is your refinery?
J Well, we can process up to 150,000 barrels of oil per day. We receive deliveries by tanker to our deep-water jetty. And we’ve got a crude oil storage capacity of four million barrels.
J Four million barrels. Wow! That sounds big to me. So what happens when the crude gets to the refining stage?
J Well, different units on the refinery distill the crude and change its chemical structure. We also take out impurities and by-products like sulphur and bitumen.
I That’s the stuff we cover roads with.
J Mm, that’s right.
I So how do the fuels leave the refinery?
J By rail or pipeline, or tanker.
J That’s by road tanker presumably.
J Oh yes, road tanker. It goes to filling stations. And of course we supply fuel oil, aviation fuel, and lube oil.
J Lube oil?
J Sorry, yes, that’s lubricating oil for engines and motors.
I I see. So it’s very varied. Now tell me, what’s the most important bit of your job?
J Looking after the 600 people who work here and taking care of the environment. Keeping everything and everyone safe.
I How do you keep the refinery equipment safe?
J Through careful maintenance. Things wear out, so we try and replace them before a piece of equipment breaks down. This ranges from day-to-day repairs to shutdowns.
I Shutdowns?
J Yes, we regularly shut down units and open vessels, towers, and heat-exchangers for inspection. You can get a build-up of impurities and oxidation so we carry out checks and repairs as necessary.
I  It sounds a really responsible job. Would you recommend refinery work to a young person?
J  Absolutely. People with refinery experience have a great future. There are good job opportunities abroad where oil-producing countries are building their own refineries. That means they can sell end products at a higher price rather than just crude oil, you see.

Listening

Part A
An oil terminal is a place where crude oil is delivered by pipeline or tanker and then stored. It's often near a refinery, but that's not always the case. For example, the Sullom Voe terminal in Shetland receives oil from offshore fields, but oil tankers take most of it to refineries in other places. By contrast, the Fawley terminal near Southampton has a refinery as well. Six tankers a day discharge their cargo into its 300 storage tanks. The terminal can receive 22 million tonnes of crude each year. The refinery processes 300,000 barrels of crude a day and is responsible for supplying 15% of the UK's petroleum products.

Part B
The Varandey oil export complex in the Arctic operates all year round in sub-zero temperatures. Working in such conditions is an enormous challenge. They finished constructing it in 2008 at a cost of four billion dollars! After travelling by pipeline from the Timan-Pechora province oilfields, crude oil is stored on its onshore facility. From November each year, thick ice covers the ocean up to thirteen kilometres from the coast. This meant building its loading jetty 22 kilometres offshore and involved making an enormous structure that was fixed to the seabed with 24 piles. Special boats keep the area clear of ice. They decided to build an eight-sided jetty against the ice. It is supplied by underwater pipes. It can receive 70,000-tonne tankers and load them at 8,000 cubic metres an hour. The terminal operates all year round. The company also plans to open up a warm water port in the Kola Peninsula in north-west Russia.

Speaking

S = Samir, M = Mehmet
S  So Mehmet, have you managed to identify the problem?
M  Yes, just as we thought, there is corrosion in the feed section.
S  Oh dear, we've had trouble with this before. Have you got any idea of the cause?
M  Well, it's not water corrosion. I imagine it's the result of sulphide attack. Anyway, whatever it is, we need to replace the section.
S  I see. Can it wait until we shut the unit down? It's in ten days.
M  Yes, I think so. I managed to carry out a temporary repair, but we really must change it then. Maybe we should use a nickel or titanium alloy next time.
S  Mm, I know we ought to use more resistant materials, but stainless steel is a lot cheaper. I'll get a work request to Engineering for a quick study.
M  OK, but it will wear out more quickly. It won't last as long.
S  How long will the work take?
M  It should take two men about six hours. It needs draining first.
S  OK. I'd better tell Mr Ali, the manager—he'll want to know. I'll schedule the manpower. Will you give me a list of the spares?
M  Sure, I'll do that.

Pronunciation

Exercise 1
1  Will you give me a list of the spares?
2  It'll wear out more quickly.
3  It won't last as long.
4  He'll want to know.

Exercise 2
1  I won't do it.
2  I don't want to do it.
3  He won't agree.

Unit 11

Speaking

M = Mirjam, V = Victoria
M  Good morning, Mirjam Lee.
V  Good morning, Mirjam. This is Victoria Mendez.
M  Hello, Victoria. How are you?
V  I'm very well, thanks. And you?
M  Fine, thanks.
V  Mirjam, Rose Tasker, the local environmental officer, wants to meet us to discuss new regulations. She wants to see the vapour recovery installation. Could we meet at your office one day next week?
M  Yes, of course. I'll be out on Wednesday and Thursday. How about Friday?
V  That would be fine.
M  Some time after 10. We're always very busy before that.
V  Let's say 10.30?
M  That's fine.
V  Good. I'll confirm it with Mrs Tasker. I look forward to seeing you then.
M  Thanks. Bye.
V  Bye.

Listening

... So, after the gas leaves the gas terminals, it is carried to the customers who require it. And this is done through the gas infrastructure. The gas infrastructure is made up of the National Transmission System, NTS, and the Local Distribution Zones, LDPs. The biggest part of the network is the National Transmission System, NTS. It consists of thousands of kilometres of steel pipes that carry gas at high pressure. The pressure is about 75 bar, so pipes have to be strong. As the gas travels through the system, it is pushed by passing through compressors stations.

The gas industry has to try to balance supply and demand. At some times of the day, customers use large quantities of gas, but at other times, they use only small amounts. So to meet this change in demand, gas is stored. In the north of England, it's stored in underground cavities or holes where salt has been washed out. Holes are drilled into salt beds below ground. Some of them are 1,800 metres deep. Then sea water is pumped in to dissolve the salt. When gas is pumped down, it pushes out the water. In the summertime, when demand is low, gas can even be pumped back into a gas field. Gas is also stored in tanks as a liquid—LNG. Along the National Transmission System, there are many off-take points. This is where gas is taken off. It can be taken to storage tanks or taken to a pressure reduction station. In the pressure reduction station, the pressure is reduced from high to medium—to about 17 bar. Gas can then be supplied directly to power stations to make electricity and to some large industrial customers or it enters the local distribution network. In the local distribution network, there are governors. These again reduce the gas pressure. So pipes carry gas at much lower pressure to commercial customers and households. When it reaches people's
houses, the pressure in the pipe is low, about 0.25 bar. Modern pipes may be made of plastic which is cheaper and easier to install. Domestic customers use gas for heating, cooking, and hot water. Industry uses gas in all kinds of production processes as well as in the production of electricity. There are a large number of ...

Unit 12

Listening

1 Hello, Marcus. I haven’t received your estimate yet. If you want us to consider your firm, I need to have it by five o’clock this evening. We’re making our final choice of contractors tomorrow afternoon.

2 This deadline is fixed, and everyone else depends on us. So we must do everything to finish it. Stop everything else you’re doing and make it your top priority. Now, Mustafa and Ranjit, you’ll need to work late to finish this. We mustn’t miss this deadline.

3 I’m sorry, but I can’t help you with this now. I have to prepare the schedule for the maintenance upgrade and then study the estimates for the flare tip upgrade. I promise I’ll look at it when I have a moment tomorrow. Sorry, I must get back to work now.

4 How are you getting on with the drawings? You don’t need to do anything too detailed at the moment, but I have to show something to the design group at Thursday’s meeting. Can I have them later today?

Pronunciation

1 piping engineer
2 construction support
3 international design contract
4 client oil company
5 a floating production, storage, and offloading facility

Speaking

Y = Yaseen, F = Fawzi, D = Dave, K = Kithsiri

Y Right, so let’s begin with the progress report. How are you getting on with the bids for the instrument panels, Fawzi?

F I’ve received four, but I’m still waiting for the last quotation.

Y Well, I want you to remind them of the deadline. I want you to tell them to submit it by ten o’clock on Wednesday morning. We can then make our choice on Friday afternoon. This job is already running late and we need to catch up.

D OK, I’ll call them straight after the meeting.

Y Now, I’d like an update about the valve replacements. How are you getting on with this, Dave?

D Well, the technicians say they are still waiting for the parts from onshore. It’s holding everything up.

Y These valves are standard so I’m sure they’re in stock. I need you to chase the order up and to give me an update later today.

D OK, I’ll make it my top priority.

Y Thanks, we don’t want general maintenance to fall behind schedule.

D No, you’re right.

Y I’d like you to ask the maintenance manager to call me. I want to fix a time when we can carry out the work. OK, now I’d like to talk about the flare replacement project. It’s an important job; I’d like you to be in charge of this, Kithsiri.

K Thanks, Yaseen, but it’ll be the first time I’ve done this kind of job.

Y Don’t worry. I’ll brief you and will be there to give you advice when you need it. Let’s talk about it over lunch in the canteen.

Unit 13

Listening

I = interviewer, P = Peter

Part A

I I’ve heard about targets and metrics for safety. What exactly does that mean?

P You already know about ALARP, don’t you?

I As low as reasonably practicable. Yes.

P Well, ALARP recognizes that you can reduce risk, but that there’s no such thing as zero risk. We use ALARP to present the Design Safety Case. For a risk to be ALARP, you need to show that the time and money that you would need to reduce a risk even further is not reasonable.

I I see. So what does this have to do with safety targets?

P This is different. This is when the installation is working. The aim is to reduce the number of accidents and hours lost to as little as possible. The safety target needs to be fair.

I Can you give me an example of a fair target?

P Yes, let’s say two shifts lost from accidents for 100,000 man hours – that’s fair. But if you set an unfair target, say two shifts lost from one million man hours, people won’t try to reach it.

I I see, so that’s the target that you aim for. And tell me, what about metrics?

P Well, metrics is simply the business of measuring and keeping records. You know, seeing whether you meet the target or not.

Part B

I Now, of course, the physical safety of the people who work in the industry is important, but what other kinds of risk are there?

P Well, for the oil company, the biggest one is financial. For example, if a company drills a dry hole, it’ll lose money – there’s no doubt about it. But in this business, you have to accept this as a possibility.

I Yes, of course.

P And then there is political risk. An area can become a war zone, like in Kuwait.

I Hmm, yes. And what about nationalization?

P Yes, that’s a big danger. If a country nationalizes the industry, foreign companies will be left with little or nothing. There’s also a situation that isn’t nationalization, but where a government changes the rules. They can say ‘Before our share was 10%, now we want 50%’. If it does this, the company won’t be able to do much about it. Effectively this is what happened with the Sakhalin project.
Unit 14

Listening

A ... and some people think that oil and gas will run out in the next 40 years.
B Hmm! So we’ll have to get our energy from other things then?
A Yes. But there are lots of forms of renewable energy.
B Renewable energy? What do you mean?
A Well, at the moment we use oil and gas to make electricity and as fuel for our cars. But we can also get energy from other things, alternative things.
B Oh! You mean energy from the sun.
A Yes, solar energy. That’s one example of renewable energy.
B But in some parts of the world the sun doesn’t shine very much.
A You’re right! That’s the disadvantage of solar energy. The sun doesn’t always shine. But it’s a renewable energy. In other words, it won’t run out when we use it. So some sunny countries could get a lot of their energy from the sun.
B Yes. Some buildings have solar panels on the roof to collect the heat from the sun. But they don’t produce electricity.
A You’re right. But there are solar power stations now that change the heat of the sun into electricity. There are lots of countries with these now – Spain, Australia, Saudi Arabia, the United States.
B That’s great! But we can also use wind to give us energy. I’ve seen pictures of wind turbines. But do you think they produce much energy?
A Yes! In some European countries they get a lot of energy from the wind.
B But it’s the same problem as the sun. The wind doesn’t blow all the time.
A Yes, but it’s renewable. Engineers are now building wind turbines offshore where the wind blows most of the time. But the turbines have to be very strong if they’re placed offshore.

Unit 15

Listening

H = Harper, W = Wald, P = Patrick, S = Scott

H So the course finishes next month. Have you made any plans, Scott?
S I’m job hunting; it’s going to be difficult to find a good job straight away. A lot of employers are looking for previous experience. What about you, Wald?
W Well, I’m lucky I suppose. The National Oil Company is paying for my studies so I’m going to start working for them in two months, God willing. What about you, Harper?
H I’d like to travel around before I make any final decision. I’m going to look for a job as a roughneck or rooustabout while I think about the future.
W Have you seen the notice on the noticeboard? Wadhi Oil is recruiting. Someone is visiting the college next week. You can make an appointment for an interview.
H I’ve already put my name down. I’m going to speak to someone next Tuesday.
S Mmm, that’s an interesting idea. I think I’ll go along too. Otherwise there’s a course that begins in September, I might apply for that.
W Another course! More qualifications, Scott! It’s time to find a job.
Vowels

- sea
- refinery
- drill
- well
- cap
- plant
- rock
- source

Consonants

- petrol
- bit
- tank
- load
- risk
- gas
- chase
- generate

- fuel
- invent
- width
- gather
- site
- reserve
- offshore
- corrosion

- accident
- accommodation unit
- acid rain
- ambition
- analysis
- apply
- apprentice
- area
- artificial

- atom
- attach
- avoid
- bit
- bitumen
- blend
- blow-out
- boiling point
- bond
- brand
- break down
- capacity

- pipe
- down
- oil
- area
- wear
- pure

- hole
- team
- unit
- string
- cell
- reserve
- yes
- water

2 to make a substance separate into parts or change into a different form in a chemical process
brief v to give somebody information about something so that they are prepared to deal with it
budget n the amount of money that is available for a particular plan or project
build up v to gradually increase in number or quantity over a period of time
burn v to destroy something by fire
2 to use oil, gas, etc. to produce heat or energy
burst pipes n tubes carrying oil that break open or split by accident, causing oil to pour out
Cap rock n a layer of solid non-porous rock above a deposit of oil or gas which prevents the oil or gas from moving upwards
capacity n the amount of oil, gas, etc. that a tanker or pipeline can hold or transport
career /ˈkærəri/ n the series of jobs that a person has in a particular area of work
carry out /ˈkærə ˈaʊt/ v to do and complete a task
catch up /ˈkætʃ ˈʌp/ v to spend extra time doing something because you have not done it earlier
cause /kɔːz/ v to make something happen
chase up /ˈtʃeis ˈʌp/ (Am E = chase down) v to contact somebody in order to remind them to do something
chemical /ˈkɛmɪkl/ adj using processes which make changes to atoms or molecules
chromatograph /ˌkrəʊməˈteɡrɑːf/ n a device that analyses the chemicals contained in a mixture by passing the mixture through a material that separates the different elements
collision /ˈkəlzn/ n an accident in which two vehicles, people, etc. crash into each other
column /ˈkələm/ n a tall vertical post, which supports a building such as an oil platform
combined /ˈkʌmbənd/ adj including or joining two or more things
complete (a well) /ˈkəmplɪst/ v to prepare an oil well for production by enabling the oil to flow and connecting the well to pipes on the surface
compressor /ˈkəmprəsər/ n a machine used to supply gas at increased pressure
condenser /ˈkændəsər/ n a device that cools gas in order to change it into a liquid
connect /ˈkənekt/ v join together two or more things; to be joined together
contract /ˈkɔntrakt/ n an official written agreement
cool /ˈkjuːl/ v to become or to make something become cold
corrosion /ˈkɔrəʒən/ n the gradual destruction of metal by chemical action
corrosive /ˈkɔrəsɪv/ adj tending to slowly destroy metal by chemical action
crane /ˈkreɪn/ n a tall machine with a long arm, used to lift and move heavy objects
crew /kruː/ n all the people working on a ship, plane, etc.
crude /ˈkrud/ adj n oil in its natural state, before it has been treated with chemicals
damage /ˈdeɪmɪdʒ/ v to harm or spoil something
dangerous /ˈdeɪndʒərəs/ adj likely to cause harm
database /ˈdeɪtəbəs/ n an organized set of data that is stored in a computer and can be looked at and used in various ways
deadline /ˈdedləm/ n the latest time or date by which a task must be completed
decommission /ˌdɪkəˈmɪʃən/ v to take equipment out of operation
decrease /ˈdiːkrəs/ v to become smaller in size, number, etc.
depth /ˈdɛpt/ n the thickness of a substance measured by its mass per unit of volume
depot /ˈdepoʊ/ n a place where large amounts of fuel are stored
derrick /ˈdɛrɪk/ n a tall structure over an oil well for holding the drill pipe
detection /ˈdetekʃn/ n the act or process of discovering or noticing something, especially by using scientific methods
disaster /ˈdaɪzəstər/ n an unexpected event, such as a very bad accident, that causes a lot of damage or kills many people
 discharge /dɪˈfʌrədʒ/ v (of a gas or liquid) to flow somewhere; to allow a gas or liquid to do this
display /ˈdɪpleɪ/ v (of a computer or device) to show information
distance /ˈdɪstəns/ n the amount of space between two places or things
distil /ˈdɪstɪl/ v to separate the different substances within crude oil by heating the oil until it becomes a gas, then
cooling it and collecting the gas and liquids that form at different temperatures
distract /ˈdɪstrækt/ v to take somebody's attention away from what they are doing
distribution /ˌdɪstrɪˈbjuːʃn/ n the system of supplying gas, oil, etc. to a number of people or places
domestic /dəˈmɛstɪk/ adj for use in the home; relating to the home
double /ˈdʌbl/ v to become twice as large
downstream /ˌdaʊnˈstrɪm/ adj relating to the refining, processing, and selling of oil and gas
draw up /ˈdrɔː ˈʌp/ v to prepare and write a document such as a contract
drill /drl/ v to make a hole in the ground in order to get oil or gas
drill pipe /ˈdrɪl pɪp/ n a long tube that is connected to other tubes in order to join the kelly to the drill bit
drill string /ˈdrɪl strɪŋ/ n the part of a drill consisting of the drill pipe and kelly and ending in the drill bit
economical /ˌɪkəˈnɒmɪkl/ adj providing good value in relation to the amount of money spent
ecosystem /ˌɪkəˈsɪstəm/ n all the plants and living creatures in a particular area considered in relation to their physical environment
enormous /ɪˈnɔːməs/ adj extremely large
environment /ˈenvərəmənt/ n the natural world in which people, animals, and plants live
equipment /ˈkwɪpmanɪt/ n the tools, machines, etc. that you need for a particular task or activity
estimate /ɪˈstɛmət/ n a guess or a calculation of the likely cost of something, based on the information that you have
excess /ˈeksəs/ adj more than is required or necessary
experience /ɪkˈspiriəns/ n the knowledge and skill that you have gained through doing something for a period of time; the process of gaining this
expertise /eikspa'riz/ n great skill or knowledge in a particular subject, activity, or job
extract /'eksstrekt/ v to remove or obtain oil, gas, etc. from something by using an industrial or a chemical process
fall /fɔl/ v to drop down from a higher level to a lower level
finite resources /'faimint ri'sɔsiz/ n a supply of something that has a definite limit or fixed size
first aid /faist 'eid/ n emergency medical treatment that is given to somebody before a doctor comes or before the person is taken to hospital
flow /flɔu/ v (of a liquid or gas) to move steadily in a particular direction
fork-lift truck /'fɔklift 'trak/ (Am E fork lift) n a vehicle with two long bars on the front for moving and lifting heavy objects
fossil fuel /'foisol fjuəl/ n fuel such as coal or oil, that was formed over millions of years from the remains of animals or plants
FPSO /'pi: es aʊ/ n = Floating Production, Storage, and Offtake facilities (= a large vessel used at sea to store and process oil or gas before it is taken away by tankers
fractionating column /'fræk'neitəln'knəmə/ n a large vertical tube that is used to separate the different substances within crude oil
fractured /'fræktʃəd/ adj (of rock) cracked
fuel /fjuəl/ n a material that you burn to produce heat or power
fuel /fjuəl/ v to supply something with material that can produce heat or power
fuel cell /fjuəl sel/ n a device for producing energy by the action of chemicals, used to provide power for a car or other vehicle
gas gathering plant /'gæs ɡædərn plant/ n a place where gas from different wells is stored and processed before it is distributed
gather /'ɡæðə(r)/ v to collect together in one place
generate /'dʒɛnəreit/ v to produce or create something such as electricity
generator /'dʒɛnəreitə(r)/ n a machine for producing electricity
geochemist /'dʒi:əu'kemist/ n a scientist who studies the chemistry of the earth and its rocks and minerals
geologist /'dʒi:ələdʒist/ n a scientist who studies the earth, including the origin and history of the rocks and soil of which the earth is made
get on (with) /'get 'on wið/ v to make progress in a task
global warming /'ɡləubl 'wɔrmŋ/ n the rise in temperature of the earth's atmosphere that is caused by the increase of particular gases, especially carbon dioxide
go ahead /gəu 'hɛd/ v 1 to happen 2 to begin to do something, especially after somebody has given permission
governor /'ɡəvnə(r)/ n a device that controls the pressure of a gas supply
gravimeter /'ɡrævɪmɪtə(r)/ n an instrument that shows the density of rock by measuring the difference in the force of gravity from one place to another
habitat /'hebɪtæt/ n the place where a particular type of animal or plant is normally found
halve /hɔlv/ v to reduce by a half
heavy /'heivi/ adj used when asking how much something weighs
hold up /həuld ‘ʌp/ v to delay the progress of something
horizontal /'hɔrɪtənl/ adj (of the direction of drilling) going across and parallel to the ground rather than going straight down
human error /'hju:mən 'erə(r)/ n mistakes made by people rather than machines, computers, etc.
increase /ɪn'kris/ v to become greater in amount, number, value, etc.
instrument /'ɪnstrəmənt/ n a device that is used for measuring things, such as speed, temperature, etc.
insulation /ɪn'sjuəlʃən/ n material that is placed around a tank to prevent heat from passing through
internship /'ɪntənʃip/ (Am E = placement) n a period of time during which a student or new graduate gets practical experience in a job, for example during the summer holiday
interpret /ɪn'təprɪt/ v to translate one language into another as you hear it
invent /ɪn'vent/ v to produce or design something that has not existed before
kelly /'keli/ n a strong pipe that is connected to the top of the drill pipe in order to turn it and lower it into the well
load /loʊd/ v to put a large quantity of things on or in a vehicle, a container, etc.
local /'ləukəl/ adj in the area nearby
logo /'ləʊgə/ n a printed design or symbol that a company or an organization uses as its special sign
magnetometer /'meɡən'təmətə(r)/ n an instrument for measuring magnetic force
maintain /meɪntən/ v to keep a building, a machine, etc. in good condition by checking or repairing it regularly
maintenance /'meintənəns/ n the act of keeping something in good condition by checking or repairing it regularly
measure /ˈmeʒər/ v to find the size, weight, quantity, etc. of something by using an instrument
meter /ˈmiːtər/ v to measure the quantity or rate of something using a meter
molecule /ˈmɔlɪkjəl/ n the smallest unit, consisting of a group of atoms, into which a substance can be divided
monitor /ˈmɔnətər/ v to regularly observe and check something in order to make sure that it is working correctly
negotiate /ˈneɡəteɪt/ v to try to reach an agreement by formal discussion
offshore /ˈɔfʃɔr/ adj happening or existing in the sea, not far from the land
offtake /ˈɔfttək/ n the removal of oil or gas from a place where it is stored
oil refinery /ˈɔil ˈriːfəneri/ n a place where crude oil is separated into different substances and processed in order to produce petrol / gasoline, gas, plastic, etc.
oil spill /ˈoil spil/ n a large amount of oil that has poured out of its container by accident; an occasion when this happens

opportunity /ˌoʊpəˈtjuːnəti/ n a time when a particular situation makes it possible to do something; a chance to do something

oversee /ˌəʊvəˈsiː/ v to watch somebody or something in order to make sure that a job or an activity is done correctly

permeability /ˌpɜːməˈbɪləti/ n the degree to which a rock allows a liquid or gas to pass through it

permission /ˈpɜːrɪmən/ n the act of allowing somebody to do something; official approval to do something

personnel /ˌpɜːsəˈnɛl/ n the people who work for an organization

piles /ˈpɑːlz/ n large posts that are pushed into the ground and used to support a building, oil platform, etc.

pipeline /ˈpaɪplaim/ n a series of pipes that are used for carrying oil, gas, etc. over long distances

plan /plæn/ v to make detailed preparations for a task or project

plant /ˈplɑːnt/ n a living thing that grows in the ground and usually has leaves and roots

platform /ˈplætfɔːm/ n a structure that stands on the floor of the sea to provide a stable base above water for drilling

poisonous /ˈpɔːzənas/ adj causing death or illness if taken into the body

pollution /ˈpɔːljuːʃn/ n the process of making air, water, soil, etc. dirty; the state of being dirty

pontoon /ˈpɑntən/ n one of several hollow structures, used to support a floating oil platform

population /ˈpɒpjuˌleɪʃn/ n all the people who live in a particular area, city, or country

pore /pɔː(r)/ n one of the small spaces in a rock that contains a liquid or gas

porosity /ˈpɔːrəsəti/ n the amount of space (pores) within a rock compared to the amount that is solid rock, usually given as a percentage

porous /ˈpɔːrəs/ adj (of a rock) having many small holes that allow liquid or gas to pass through slowly

precaution /ˈprɛkəʃn/ n something that is done in advance in order to prevent problems or to avoid danger

pressure /ˈpreʃə(r)/ n the amount of force that a gas or liquid produces in a pipe or container

priority /ˈprɪərəri/ n something that you think is more important than other things and should be dealt with first

procedure /ˈprɛskrɪdʒə(r)/ n an official way of doing something

process /ˈprɒsəs/ n a series of things that are done in order to achieve a particular result

progress report /ˈprɔgres rɪˈpɔːrt/ n a spoken or written account of the work that has been done during a particular period

promote /ˈprɒməut/ v to move somebody to a higher rank or more senior job

protect /ˈprɛkt/ v to make sure that something or somebody is not harmed, injured, damaged, etc.

pump /ˈpʌmp/ v to make a liquid, gas, etc. flow in a particular direction by using a pump (= a machine that uses pressure to force a liquid, gas, etc. into or out of something)

qualification /ˌkwɒlfɪˈkeɪʃn/ n an exam that you have passed or a course of study that you have successfully completed

recommend /ˌrekəˈmend/ v to advise somebody to do something

reference /ˈrefrəns/ n a letter written by somebody who knows you to a new employer, giving information about your character and abilities

refine /rɪˈfain/ v to make crude oil into gasoline, plastic, etc. by separating it into different substances

regulation /ˌredʒəˈleɪʃn/ n an official rule made by a government or some other authority

reheat /ˌriːˈhit/ v to make something hot or warm again

remotely /ˌriːˈmɑːtli/ adv from a distance

renewable /ˈrɪˈnuːəbl/ adj (of energy and natural resources) able to be replaced and used without the risk of finishing it all, for example energy from the sun, sea, wind, etc.

reputation /ˌrɪˈpjuːtʃən/ n the opinion that people generally have about a person, company, etc.

reserve /rɛzərv/ n a supply of oil, gas, etc. that you can take from the ground

reservoir rock /ˌrɛzəˈvɔːr rɔk/ n a type of rock with spaces inside it that contain oil or gas

responsibility /rɪˈspɒnsəˈbɪləti/ n a duty to take care of something that you are required to do as part of your job

rig /rɪɡ/ n a large structure in the sea with equipment for drilling for oil and gas under the seabed

risk assessment /ˈrɪsk əˈsesmənt/ n the process of examining the potential dangers involved in a particular situation or way of working

road tanker /ˈrɔːd tɛŋkər/ n a truck that carries oil, gas, or petrol in large quantities

rotary /ˈrəʊtəri/ adj (of a machine) having parts that turn around (= rotate)

rotate /ˈrəʊtət/ v to move or turn around; to make something do this

roustabout /ˈrəʊstəbəʊt/ n a man with no special skills who does basic work on an oil or gas rig

rule /rʊl/ n a regulation or principle that determines what someone can or cannot do in a particular situation

run out /ˈrʌn ˈaʊt/ v (of a supply of something) to become used up or finished so that none remains

safety /ˈseɪti/ n 1 the state of being safe and protected from danger or harm 2 [before other nouns] something that is designed to prevent injury or damage

saline /ˈsəliːn/ adj containing salt

sample /ˈsæmpl/ n a small amount of something that is examined in order to find out what the rest of the substance is like
schedule /'sɛdʒuə/ n a plan that lists all the work that you have to do and when you must do each thing
sedimentary /'sedɛməntəri/ adj (of rock) formed from the sand, mud, etc. that settles at the bottom of the sea, etc.
seismic /'sɛzəmik/ adj relating to earthquakes or other vibrations of the earth
semi-submersible /'semi səbˌməsərl/ adj (of an oil or gas platform) supported by tanks underwater that enable it to float instead of standing on the floor of the sea
separate /'sɛpərət/ v to divide things into different parts or groups
shut down /ʃʌt 'daʊn/ v to stop a factory, a refinery, etc. from operating; to stop a machine from working
site /sait/ n an area of ground where something is located
skill /skil/ n the ability to do something well
slippery /'slipəri/ adj (of an object or a surface) difficult to hold or to stand on, because it is smooth, wet, or polished
source /sɔs/ n the place or thing that you get energy from, for example the sun or wind
source rock /'sɔs rɔk/ n a type of rock containing deposits of natural material from which oil or gas is produced by bacteria
stable /'stebl/ adj firmly fixed; not likely to move
storage tank /'streɪdʒ tɛŋk/ n a large container for holding oil or gas
sub-sea /'sʌb sɛi/ adj situated or happening underwater
supervision /'səpər vɪsrən/ n the process of observing and directing the work of somebody to make sure that everything is done correctly, safely, etc.
surface /'sɜfɪs/ n the outside or top layer of something
survey /'sɜrvə/ n the act of examining and recording the measurements, features, etc. of an area of land in order to make a map or plan of it
tanker /'tæŋkə(r)/ n a ship or truck that carries oil in large quantities
target /'tɑrgət/ n an objective or a result that you try to achieve
team /tiːm/ n a group of people who work together
terminal /'tɜrmənəl/ n a place where large amounts of oil or gas are stored in tanks, especially at the end of a pipeline before going to a refinery
topsides /'tɔpsaɪdz/ n the part of an oil platform that is above water
trainee /'treinɪ/ n a person who is learning how to do a job
translate /'trænsəl/ v to express spoken or written words in another language
tricone /traɪkoʊn/ adj (of a drill bit) having three cutting pieces with a round flat base and sides that slope to a point
turn into /'tɜrn 'ɪntə/ v to become something; to make something become something else
unload /'ʌnlaud/ v to remove things from a vehicle or ship
update /'æp'det/ v to make something more modern by adding new parts, etc.
upstream /'ʌpstrɪm/ adj relating to the exploration, drilling, and production of oil and gas
vapour /'vɛrpə(r)/ n a mass of very small drops of liquid in the air, such as steam
vertical /'væktɪkl/ adj (of the direction of drilling) going straight up or down from the surface
viable /'vɛəbl/ adj able to be done in a successful way
vibrator truck /'værbreɪtə træk/ n a large vehicle with devices that produce vibrations in order to examine what kinds of rock are under the ground
warning /'wɔrnɪŋ/ n a piece of advice, a signal, etc. given to somebody about a possible risk or danger so that they can avoid it
waterproof /'wɔtəpruʃ/ adj (of a material or an object) not letting water pass through it or enter it
wear out /'weər 'ɔut/ v (of a machine, a tool, etc.) to no longer work properly because it has been used too much
weight /weɪt/ n how heavy something is, usually measured in kilograms, pounds, etc.
well log /wel ˈlɒɡ/ n a record that is made after a new oil well is drilled, describing the types of rock in the area and the depths at which they are found
width /ˈwɪdθ/ n the measurement from one side of something to the other; how wide something is
work out /wɔrk ˈaʊt/ v to calculate something, such as the value of an oil supply
work placement /ˌwɔrk ˈplɛɪsmənt/ n = internship
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